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### GENERAL NEWS SECTION

\*Illustrated.

"The freight equipment is in the worst condition it has been for years," according to a statement made by F. C. Schultz,

## Freight Car Maintenance

chief joint interchange inspector at Chicago, the largest interchange terminal in the world. As 10,000,000 cars per year are handled at this point the condition there is indicative of the conditions over the entire country. It is a well known fact that the railway shop forces have been greatly reduced during the past year on account of the general depression in business, and this undoubtedly is the reason why the equipment is in such poor condition. However, there is a limit to which this retrenchment can be carried before it becomes a source of excessive future expense. Every road that has found it necessary to make such retrenchments should carefully watch for this limit with the idea in mind that every dollar saved for dividends this year may mean a sacrifice of two dollars next year. The shop forces should now be augmented in order that the summer and fall business may be properly handled. Lack of equipment means loss of revenue and the lack of equipment in proper condition means a loss of revenue and an increase in loss and damage claims.

Although the legislatures in the states that have two-cent fare laws have shown no disposition to come to the aid of the railways

## Decrease in Railway Legislation

by restoring a part of the reduction in rates made by the passage of such laws, it is evident that there has been a marked tendency on the part of legislators this year to recognize that restrictive and oppressive legislation has gone about far enough. The Special Committee on Relations of Railway Operation to Legislation has just issued a report calling attention to the fact that the amendment to the boiler inspection act was the only law relating to operation passed during the Congress which adjourned on March 4. It also notes that of 1005 bills relating to railway operation introduced in 43 state legislatures up to May 1, only 94 have been enacted into laws, most of which deal with relatively unimportant features of operation. Of the 43 legislatures that have been in session 31 have already adjourned and the others are expected to conclude their sessions shortly. In 1914, with 14 legislatures in session, 236 bills relating to railway operation were introduced and 27 were passed, but for purposes of comparison it is necessary to go back to 1913, when the legislatures of 42 states were in session. In that year, 1,395 bills of the character under discussion were introduced and 230 were passed. There is probably a greater contrast between the characters of the laws passed than between their numbers. In 1913, for example, there were 14 extra crew laws enacted. In 1915 51 bills were introduced relating to the number of men to be employed in train or switching crews, none of which has been passed, and most of the bills which would have added greatly to the expenses of the railways, including the train limit bills, have thus far failed of enactment.

The results of government construction of the National Transcontinental Railway in Canada will not be hailed by advocates of

## Costly Government Construction in Canada

government ownership of railways as an argument for the adoption of that policy in this country. The line was originally built with the expectation that it would be leased to and operated by the Grand Trunk Pacific. But because of the enormous amount of expense which the government incurred in building it the Grand Trunk Pacific has decided that it cannot afford to lease it and has refused to take it over for operation. It has become necessary, therefore, for the government itself to assume the burden of operating it; and this it began to do on May 1. Since the Grand Trunk Pacific decided it could not operate the line profitably, it is not reasonable to expect that the government will be able to do so, in view of the heavy losses it has regularly suffered from its operation of the Intercolonial. The story of the National

Transcontinental is instructive. Parts of it have been told from time to time in these columns; but it will bear bringing up to date. The construction of the line was turned over to a government commission in 1904. It was to be 1,804 miles long, and the official estimate of its cost made by the minister of finance was \$61,415,000. The road was to be leased to the Grand Trunk Pacific, which, after 1922, was to pay for its use a rental of three per cent of its cost. Up to September 30, 1911, however, the line had cost \$109,000,000 and the latest estimate of its total cost was \$173,000,000, or nearly three times the original estimate. The Grand Trunk Pacific would have been willing to have leased it if it had cost approximately the amount originally estimated; but it was not willing to pay a rental three times as great as it originally expected to. Much is said by advocates of government ownership about the advantages to be derived from the use of the government's credit in raising capital for railway development. But if, as has proved to be the case in Canada, a government will spend three times as much per mile to build a railway as would be spent by a private company, its ability to borrow money at a low rate will fall far short of offsetting the disadvantage resulting from its incompetence and wastefulness in expending the money raised.

#### TRAIN ACCIDENTS IN APRIL

FOR the month of April our list of train accidents has but two items. Except for these we have seen no report of any collision or derailment in the United States, which was of enough importance to bring it within the "prominent" class from which we make up our record. April is a month in which a light record is always to be expected, but this is the first time in 43 years, or since these records have been kept, that this paper has not printed a monthly train-accident record including at least a half dozen items of considerable importance.

This, of course, does not mean that there were not many accidents last month. The government records, to be compiled a month hence, undoubtedly will show, judging by past years, a list of collisions and derailments involving a loss of somewhere around a half million dollars and a total of many scores of employees injured, with the usual proportion of fatal injuries. But April is the month in which the notable accidents are always at their lowest ebb. The April records of the last 20 years contain only three train accidents of what may be called

For the first six of the last 20 years (years 1896-1901) the reports of passengers killed in April stood as follows:

Passengers Killed in Train Accidents					
	April	Average per month for the whole year		April	Average per month for the whole year
1896 .....	6	10.7	1899 .....	2	9.4
1897 .....	2	5.0	1900 .....	3	9.4
1898 .....	0	4.0	1901 .....	0	..

The only explanation of April's peculiarity that is discernible is to be found in the combination of favorable weather, moderate volume of traffic, and a minimum of inexperienced trainmen. A lessening of the volume of traffic and the number of trains run both reduces the chance of accident and causes an improvement in the quality of the service by forcing the dismissal of some of the men, the newest and presumably least efficient men being, of course, the first to go.

An examination of the April records for the past few years serves to make prominent another fact; the fact that the number of collisions is falling off a good deal faster than the number of derailments. This appears also in the Interstate Commerce Commission bulletins. In the early days of the government accident records the quarterly statements of collisions and of derailments, when measured by the money loss, were generally somewhere near equal, but now they are usually very unequal.

In a matter involving so many uncertain factors, precise comparisons are hardly worth while; but the reasons for this change are quite clear in at least two respects, namely, the extension of the use of the block system (and of air-brakes) in preventing collisions, and the increase in the size and weight of freight cars and engines, and in speeds of freight trains, in enhancing the cost of derailments. The difference between the latest records and those of ten years ago may be seen in the double-column table. The most instructive comparisons are those between the items of cost—columns 4, 7 and 10. "Cost" does not include payments for freight damaged or for personal injuries, and therefore gives no adequate idea of the total losses due to train accidents; but for purposes of comparison, one year with another, these partial figures are even better than the totals would be, for, no doubt, the fluctuations are not so great. Train mileage cannot be compared, satisfactorily, as the figures for 1914 have not yet been published. The showing for improved safety of life and limb is even better than the figures indicate,

COLLISIONS AND DERAILMENTS IN THE UNITED STATES; DATA CONCERNING COST, 1902-1905 AND 1910-1914

Twelve months ending June 30	Freight ton mileage (Millions)	A All collisions			B Rear and butting collisions			C Derailments		
		Number	Cost	No. killed	Number	Cost	No. killed	Number	Cost	No. killed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1914.....	288,320*	5,241	\$3,775,279	287	1,299	\$1,805,906	180	8,565	\$7,189,902	318
1913.....	301,399*	6,477	4,768,772	457	1,825	2,646,479	340	9,049	8,280,442	334
1912.....	264,081	5,483	4,330,206	378	1,846	2,607,017	274	8,215	7,197,252	394
1911.....	253,784	5,605	4,302,056	436	1,708	2,491,712	296	6,260	5,549,724	349
1910.....	255,017	5,861	4,629,279	433	2,006	2,913,144	313	5,918	5,194,679	340
1905.....	186,463	6,224	4,849,054	608	2,200	2,914,918	456	5,371	4,862,602	456
1904.....	174,522	6,436	5,190,918	630	2,664	3,379,445	475	4,855	4,192,159	388
1903.....	173,221	6,167	5,615,746	...	.....	.....	...	4,476	3,981,231	...
1902.....	157,289	5,042	4,285,683	...	.....	.....	...	3,633	3,359,723	...

\*Small roads (Class 3) not included.

the first magnitude; Martins Creek, N. J., 1911, twelve persons killed; Bartlett, N. D., 1907, five killed, and Buffalo, Kan., 1903, eleven killed. In the last named case, a rear collision, all of the victims were employees.

In April, 1914, six persons were killed in an electric car, and this year there was an electric-car disaster in Detroit, but these are not included in the train-accident record.

Prior to the establishment of the government accident records, in 1901, the *Railroad Gazette* kept a more complete record, putting into it not only the "prominent" cases, but all train accidents, of which information could be gathered, where any person was killed, or where many were injured, or where the money loss was very large. April had the same peculiarity then.

for in the earlier years the number of casualties does not include trespassers, whereas in the later years it does. And the increase in the volume of traffic is greater than appears, as shown by the footnote. Column B, which is included in column A, is shown separately because, with slight exceptions, it is only the collisions in column B which are susceptible of prevention by the block system. This column, therefore, throws most light on the decrease in collisions as a result of the increase of the use of the block system.

In spite of the uncertainty due to the numerous indeterminate factors, the facts given in this ten-year comparison afford ground for marked satisfaction. For example, take 1904 and 1914. Though the cost item under the head of derailments in-



creased over 70 per cent, with an increase of traffic of 65 per cent, the number of persons killed decreased 18 per cent. The cause of the increase in cost of derailments has already been suggested. While from 1904 to 1914 the derailment costs were thus increased, collisions costs fell off 27 per cent, and the killed in collisions from 630 to 287, or no less than 54 per cent.

That the decrease in the number and seriousness of train accidents has been more rapid during the past twelve months than in earlier years, is a matter of common knowledge, a principal cause being the falling off in the volume of traffic. The smallness of the totals, with the small proportion of collisions, as compared with derailments, may be seen in the following table:

Number of Prominent Train Accidents Reported

	Colli- sions	Derail- ments		Colli- sions	Derail- ments
1915 March .....	2	9	1914 August .....	4	6
1915 February .....	5	9	1914 July .....	2	6
1915 January .....	2	14	1914 June .....	3	11
1914 December .....	3	8	1914 May .....	2	11
1914 November .....	5	8	1914 April .....	1	8
1914 October .....	3	8			
1914 September .....	0	7	Total, 12 months...	32	105

These, it is to be remembered, are only the prominent accidents, published in the newspapers. From a statistical standpoint the items may be only straws; but straws show which way the wind blows.

#### THE COMMISSION ON RELATIONS BETWEEN RAILWAYS AND WATERWAYS

THE Interstate Commerce Commission, in an opinion by Commissioner McChord, has given the most rigorous possible interpretation and application of the part of the Panama Canal act relating to the ownership of boat lines by railways. The law provides that it shall be unlawful for any railway to control or have any interest in any common carrier by water operating through the canal or elsewhere, with which the controlling railway does or may compete. This provision is qualified by another to the effect that if the Interstate Commerce Commission believes that any existing service by water other than through the canal is being operated in the interests of the public, and that an extension of the time during which it is under the control of a railway will not "exclude, prevent, or reduce competition on the route by water," the commission may extend indefinitely the period during which such service by water may continue to be operated. In the administration of these provisions, the commission has ordered all the eastern railways to dispose of their interests in boat lines on the Great Lakes.

Some of these railways, such as the Pennsylvania, the Erie, and the New York Central, own railway lines to Chicago paralleling the lakes on which the water carriers in which they are interested operate. The rails of others, such as the Lehigh Valley and the Delaware, Lackawanna & Western, terminate at Buffalo and therefore connect with, but do not parallel, the lakes and the routes of the lake carriers. Doubtless in requiring the former class of railways to give up their boat lines the commission is but giving effect to the spirit and intent of the law. But the commission holds that the railways which end at Buffalo as well as those whose rails extend to Chicago, must give up their interests in the water lines.

The terms of the law make it plain that Congress never intended that any railway should be required to dispose of its holdings in any water carrier with which it did not and could not compete. The language used makes it especially clear that Congress never intended this with respect to railways having interests in boat lines on the Great Lakes and other inland waterways. How, then, does the commission reach the conclusion that railways which end where the service on the Great Lakes begins may and should be required to dispose of their holdings in lake lines? These railways have through rates and through routing arrangements in connection with railway lines operating between Buffalo and Chicago. The commission finds that by means of these through traffic arrangements with connecting railways, the Lehigh Valley and the Lackawanna are

competing with their own boat lines, and it is on this theory that it bases its conclusion that their ownership of interests in boat lines is contrary to the law and to the public welfare.

In spite of the commission's labored and metaphysical reasoning, it is hard for persons not gifted with its powers of ratiocination to see how a railway which begins at New York and ends at Buffalo can compete with a boat line which begins at Buffalo and ends at Chicago. Common sense suggests that the competing with the boat line between Buffalo and Chicago must be done by some other railway, and common sense sometimes, although not always, has weight with the courts. The courts may also consider the fact that under the act to regulate commerce, the railways from New York to Buffalo may be required to make reasonable through rates and routes in connection with railways from Buffalo to Chicago, and that the commission is the body which is empowered to enforce this regulation.

If all the eastern railways except those terminating at the eastern end of the lakes were required to dispose of their boat lines, there would be an increase of competition between the water carriers themselves and between them and the railways. A large majority of the lake lines would then be owned by industrial corporations and independent companies. The fact that some boat lines were owned by eastern railways terminating at Buffalo would not, it would seem, affect the competitive situation materially, if at all. If, at the most, it would affect it only to a slight extent, and nevertheless it can be held that the ownership of some boat lines by railways terminating at Buffalo, is against the public welfare, this can be only on the ground that the public welfare requires absolutely unrestricted competition of the water lines against the railways. As a matter of fact, this seems to be the very position the commission takes. It descants on the beauties of water transportation and the desirability of competition of waterways with railways in the rhetoric of an orator at a river and harbor congress. It says:

On a water course, where the boats and boat lines are free from domination or control by the railroads, and *where they are left to survive as their merit and the ingenuity of their owners makes possible*, there will be, and always is, a healthy rivalry and striving between such boat lines themselves and with paralleling railroads for all suitable and available traffic. There is competition. This rivalry manifests itself in several ways. *The rates charged fluctuate according to economic principles*, and the shipper enjoys invariably, as a result, *lower charges for the transportation routed over such waterways and thereby reaps a return from the "nation's highway."*

These statements—the italics in which are ours—cannot be supported by evidence. Seldom or never are boat lines on inland waterways "left to survive as their merit and the ingenuity of their owners makes possible." They are usually subsidized by government appropriations for the development of the waterways they use. As to the statement regarding, "healthy rivalry and striving between such boat lines themselves, and with paralleling railroads," there almost always are agreements between rival boat lines to limit competition between themselves, and the restrictions which the Interstate Commerce act imposes on the railways prevents "healthy rivalry and striving" between water carriers and paralleling railways. Even with all the governmental aid and protection given water carriers it is not a fact that they are usually able to compete effectively with railways. The Mississippi is a deep waterway between Memphis and New Orleans. The carriers on that river are not dominated by railways; yet hardly a ton of freight moves by water between the terminals at Memphis and New Orleans. Less extreme examples could be cited all over the United States. The evidence all shows that the inland water carriers of the United States, excepting perhaps on the Great Lakes, cannot be made able to compete with the paralleling railroads even by government expenditures which cover a large part of the cost of handling the **water traffic**; and it is very questionable if independent water carriers on the lakes can hold as much of the traffic as has been held by the boat lines which have been controlled by the railways.

As to the statement that "the rates charged (by the water carriers) fluctuate according to economic principles," it would

be interesting to know whether the commission means by this to indorse the way in which rates by water commonly are made. The "economic principle" on which they usually are based is that of "charging what the traffic will bear." Sometimes they are high and sometimes they are low. They may be low for one shipper and high for another shipper of the same commodity, moving on the same boat. The one shipper may get a rebate and the other may not. If the "economic principles" observed in making rates by water are right, why should not the railways be allowed to make rates according to the same principles? Why should the railroads be prohibited from discriminating unfairly between different shippers, required to give notice of changes in their rates, and have advances in their rates made subject to suspension by the commission? If on economic principles the water lines should be encouraged to compete with the railways by making rates in this manner, why should severe restrictions be imposed on the way in which railways may make rates to meet water competition?

It is somewhat surprising to find the commission assuming in the opinion in this case, the same attitude of a mother to water transportation and a stepmother to rail transportation which is assumed by Congress and a large part of the public—and that not the most intelligent or least prejudiced and disinterested part of the public. Perhaps in doing this the commission is merely reflecting and carrying out what it understands to be the will of Congress and the public. But have we not a right to expect an expert body charged with the duty of regulating both rail and water transportation to reason and act on better information and sounder principles than the legislative body and the public which have delegated certain functions to it on the assumption that the exercise of those functions requires expert knowledge and judgment?

### NEW BOOKS

*Railroad Speed Tables and Time Card Constructor.* By Otto Holstein, P. O. Box 1216, San Antonio, Tex. A thin pocket book, 3¼ in. by 8¼ in. Bound in pasteboard. Published by the author. Price \$1.

This is a hand book for use in correcting time tables. It is much like Fleming's, which was issued in 1885 and Beaver's, which was issued in 1913 and was noticed in these columns January 30, 1914. The tables give even miles from 1 to 100, and rates of speed from one mile to 60 miles an hour. A separate chapter gives the rate of speed in miles per hour of a train running one mile in any period of time (stated in even seconds) from 30 seconds to 10 minutes 59 seconds.

*Who Built the Panama Canal?* By W. Leon Pepperman, chief of office of administration of the Second Isthmian Commission. Size 5½ in. by 8 in., 419 pages, 27 illustrations. Bound in cloth. Published by E. P. Dutton & Co., 681 Fifth avenue, New York City. Price \$2.

Any book on the Panama Canal is of particular interest at the present time. Four separate administrations have shared in the construction of this canal; the French, the Army and Navy, the Railway and the Goethals. Each had its particular function and contributed to the ultimate success of the undertaking. This book pays particular attention to the third or railway regime. In the earlier chapters it outlines the conditions existing when the railway men took charge in 1905 and the difficulties confronting the new administration. The major portion of the book is devoted to the accomplishments of the two succeeding years under the administration of T. P. Shonts, chairman, and John F. Stevens, chief engineer of the Isthmian Commission.

At the time of his appointment Mr. Shonts was president of the Toledo, St. Louis & Western Railroad, and Mr. Stevens had just resigned the vice-presidency of the Rock Island. W. G. Bied, now president of the Chicago & Alton, resigned as assistant general manager of the Rock Island to become general superintendent of the Panama Railroad. J. G. Sullivan, now chief engineer of the Canadian Pacific, was first assistant to Mr. Stevens. David W. Ross resigned as superintendent of transportation of the Illinois Central to assume charge of the

purchasing department of the canal. E. J. Williams, now treasurer of the McCord Company, resigned as paymaster of the Chicago & North Western to become disbursing officer on the isthmus. E. S. Benson, general auditor of the Oregon Railway & Navigation Company, and Walter G. Tubby, general storekeeper of the Great Northern, resigned to accept similar positions at Panama.

At the time the railway men took hold the problems of sanitation and organization were of at least equal importance with those of engineering, and the solution of the two former had to precede the latter. Mr. Pepperman describes the methods adopted to secure these desired results, paying particular attention to the problem of organization. By eliminating the customary governmental red tape and introducing railway methods, Mr. Pepperman relates how Mr. Williams saved the United States approximately \$750,000. On another page he describes how Mr. Bied saved \$8,000,000 by improvements in the methods of handling excavation, etc. Considerable space is given to a discussion of the incidents concerning the resignation of John F. Wallace as chief engineer, as well as to the solution of the labor problem, the choosing of the lock type of canal and the function of the Panama Railroad. The book concludes with a description of Panama as it existed at the close of the railway regime in 1907, a short history of the Panama revolution and a discussion of the value of the canal itself.

There has been a great deal written and published within recent months regarding the building of the canal. The conclusion which would naturally be drawn from most of this literature is that practically the entire credit for its successful construction should be given to Colonel Goethals and his administration. In fact, this conclusion has been drawn and used as a basis for many arguments in favor of government ownership and management of railways and other similar governmental activities. However, Colonel Goethals himself has publicly acknowledged the debt which the nation owes to Mr. Shonts, and the other railway men with whom the latter surrounded himself when he was in charge of the work. The organization which the railway regime built up and the methods which it introduced, Colonel Goethals apparently concedes, were necessary for the subsequent prosecution of the undertaking. For example, it was during the railway regime that yellow fever was driven from Panama, and without this accomplished no organization could have carried the project to completion.

There can be no question about the vitally important part which the railway regime played in creating the conditions, developing the organization and adopting the methods necessary to the success of the task, and Mr. Pepperman has rendered a distinct public service in both telling the reasons why the army and navy regime, which preceded the railway regime, had made so little progress, and why the railway regime was able to make so much progress in so short a time. The army and navy regime tried to use the customary government methods, and it was not until the railway men came in and brushed those methods aside and substituted railway methods, that the dirt really began to fly.

But while Mr. Pepperman has rendered a public service in setting forth the importance of what the railway men did, many well informed persons are likely to think that he minimizes too much the importance of what was done by John F. Wallace when he was chief engineer, and by Colonel Goethals and his staff. There still remained after Mr. Shonts and his associates had left, a big task requiring administrative ability of a high order, and while the work which the railway men did was necessary in order to prepare the way for later achievements, still, those who are disposed to give due credit to all concerned will not withhold from Colonel Goethals the glory of having performed his part in a way commanding respect and admiration.

The point is that there is glory enough for all, and that that belonging to the railway men need not be minimized in order to give to Colonel Goethals all that belongs to him, or vice versa.

Mr. Pepperman's book is well illustrated with pen and ink drawings by J. Pennell.



# Railway Storekeepers' Association Convention

## Reports on Scrap and Scrap Classification, Recommended Practices, Reclamation Work, Accounting, Piece Work

The twelfth annual convention of the Railway Storekeepers' Association was held at the Hotel Sherman, Chicago, May 17-20. The association was welcomed to the city by Mayor Wm. H. Thompson and an address was made by E. D. Sewall, vice-president, Chicago, Milwaukee & St. Paul. Mr. Sewall referred to some remarks he had heard which included the statement, "I have no sympathy with the railroads in their present predicament; they brought it on themselves and should get out the best way they can." In his opinion the railways have never received the consideration to which they are entitled. He touched on the attitude of politicians and sensational publications regarding capitalization and defended the practices commonly employed in obtaining capital. Ninety per cent of the present complaints are based on conditions of many years ago.

G. G. Allen, general storekeeper of the Chicago, Milwaukee & St. Paul and president of the association, said in his address that the association had prospered during the past year, 105 new members having been added, 20 of whom were from roads not previously represented. Referring to storekeeping practices, he emphasized the value of well-equipped storehouses in promoting economy, and advocated the employment of supply cars on roads whose location and physical condition lent themselves to such a practice.

The secretary-treasurer reported a total membership of 823, and \$546 cash on hand.

### SCRAP AND SCRAP CLASSIFICATION

The real meaning of the word scrap is not fully understood by the average railroad employee. To most people scrap implies something useless, without value and to be disposed of only by being cast away. The fact that an article has been cast off does not imply in any way that it is without value for some other purpose. The economical handling of scrap in all of its phases is one of the most important items in railroad operation.

The cost of handling scrap should be considered carefully, as duplicate handling is very expensive. There are some kinds of scrap having such small market value that, if handled through one or two operations at scrap yards or on line of road, the actual cost of handling is greater than the amount realized from the sale of the scrap. On the other hand, with certain kinds of scrap one handling or operation, such as sorting out pieces of certain size or length, or cutting a few bolts and rivets, will result in a saving of several dollars per ton when the scrap is placed on the market.

Scrap should be picked up by section gangs daily and assembled at points designated, such as tool houses, etc. After it is assembled at these points it should be loaded at intervals suitable to conditions.

In loading scrap, rails and frogs should be loaded separately from track scrap, if possible. Mechanical scrap picked up off the right of way and in yards should be loaded separately; serviceable roadway material should be separated and transferred from time to time, instead of ordering new material.

Mechanical scrap should be forwarded to the nearest mechanical shops or supply yard for reclaiming. After reclaimed material has been removed, the car should be loaded to capacity with other scrap and forwarded to the place designated as a general scrap or supply yard, for making ready for the market.

In the handling of scrap, important features to consider are the equipment and back haul. The selection of equipment should be made from cars used for rough freight handling; consideration should also be given to the loading of

scrap in open or closed cars to suit conditions at the general supply or scrap yard.

Another feature that should be followed up very closely is the loading of equipment to full tonnage. Oftentimes scrap is forwarded long distances with light load, whereas it could be started out with a light load and all scrap picked up until reaching general headquarters, by which time, if properly handled, the car would have its full tonnage.

Special care should be given to the switching of cars in and around scrap yards with a view of curtailing unnecessary switching. It is necessary that cars loaded ready for weighing be pulled out at certain intervals in order to save switching and as many cars as possible should be handled at this particular time, with the understanding, of course, that other cars will be set immediately for reloading. Scrap should not be loaded in foreign cars unless this is absolutely necessary, and in case it is loaded in foreign cars, the scrap yard foreman should give these preference in order to release the cars promptly.

[The committee suggested the special preparation of certain specified items of scrap not covered in the scrap specification, in order to obtain a better price, the understanding being that this will not change the present scrap classification.]

The report is signed by W. Davidson (chairman), Ill. Cent.; W. A. Linn, C. M. & St. P.; A. L. Tucker, C. & N. W.; H. E. Rouse, C. G. W.; J. F. Rothschild, C. B. & Q.; F. A. Bushnell, G. N., and H. Scatchard, N. & W.

**Discussion.**—Several members did not approve the addition of a classification for miscellaneous mixed scrap; others believed it necessary in order to provide for small roads without means of classifying and preparing scrap. Reference to the separation of high speed steel scrap brought out the fact that most roads do not have any to sell, a great many welding the small pieces on soft steel and thus using them up. Several members were of the opinion that scrap should be sold direct to the consumer and that the scrap dealer be eliminated. It was decided not to adopt the mixed and miscellaneous scrap classification.

### RECLAMATION OF MATERIAL

The committee finds that a great deal has been accomplished in the reclaiming of material and also that there is much more to do than has been done. The work needs much systematizing, intelligent supervision, more efficient methods and machinery, and more education of the users of material as well as the reclaimers. There is a vast amount of money tied up in material in store stock under the supervision of the storekeepers, as well as money spent for purchases, which we are responsible for. How much can we reduce purchases and the amount of money tied up in stock material by more efficient reclamation, is the problem which we, as storekeepers, must solve.

The committee believes both purchases and stocks can be reduced materially by reclamation work. The reclamation of material should be under the supervision of the store department for the following reasons:

(1) The store department supervisors are already trained for the work.

(2) The assembling of reclaimed material, its classification, disbursement and accounting is directly in line with good storekeeping.

(3) Centralization of all discarded, second hand, obsolete and scrap material at designated scrap yards under the store department has been found by actual experience to be the best method. The handling of reclaimed material is store department work, as it already has the organization to re-

claim that which is fit to use for the purpose originally intended and can easily supervise the work necessary to make reclaimed material into any shape desired. The store department knows what material cannot be reclaimed for any use and will quickly turn this into money to the best advantage.

(4) The store department has adequate records, showing amount of material used and knows how much of each kind of material to reclaim and will prevent big losses by reclaiming more material than is needed. The store department will also prevent working over material that is not needed.

(5) The store department is in constant touch with the markets and knows at all times the different costs of all articles.

(6) The store department is not only interested in the use of material, but is interested in its abuse. Reclaiming material often shows where there has been abuse, and the store department is in the best position to stop abuse, as it is vitally interested, being measured by the purchases which the abuse increases.

(7) The store department labor force and handy men can do the work cheaper than any other department, as it is necessary for the other departments to do reclamation work in connection with their regular work, which requires high paid mechanics and skilled labor.

There can be no set rules or regulations to cover reclamation work, as the conditions vary so much that each individual case will have to be decided upon its merits. The committee finds, after careful investigation, that the railroads should build and equip efficient reclamation plants (these to be worked up gradually as the needs demand) to handle a large part of the reclamation work, if the best results are to be obtained.

The geographical location of the road, location of shops, scrap market, traffic tide, etc., should govern the location of a reclamation plant and scrap dock. It should be such as to save back haul of scrap, and at the same time give a minimum haul for reclaimed material and be a good distributing point. Of course, the present location of the scrap dock, size of shops using reclaimed material, land, tracks and buildings obtainable for reclamation work will have to be large governing factors in the location, as well as the size of the appropriation obtainable for this work.

Care must be exercised to see that the plant is so located that there will be room for future growth.

The size of the plant, of course, will govern the organization. The committee recommends that the reclamation plant and scrap dock be under one general foreman, whose rate of pay should be from \$100 to \$150 per month, to whom should report the foreman of rolling mills; foreman of scrap dock (rate of pay \$70 to \$90 per month); leaders (about one for every six laborers), 17 cents to 35 cents per hour; clerks; piece work inspectors; handy men for operating machines and doing special work (16 cents to 30 cents per hour), and laborers (at labor rates).

The leaders or gang foremen should be carefully selected and trained in their duties. By having leaders it only makes it necessary for the foreman to educate them and hold them responsible for work under their supervision, and then they in turn can educate the men.

The number of clerks and the rate of pay will depend on the size of the plant and work necessary to be done.

Handy men or operators should be used in reclamation plant instead of mechanics and journeymen. Much of the work of the reclamation plant is a growth of that formerly done on the scrap dock. Practically all of the work requires but one operation.

All work in the reclamation plant and on the scrap dock should be done piece work and all day work eliminated.

The size of the plant will depend on the size of the road, the number of plants on that road and the location and space available. The plant should be large enough to prevent con-

gestion and so it can be arranged to handle material at the minimum cost. It is a mistake to build a plant, or any part of one, without a complete, comprehensive plan. Many of our reclamation plants are poorly laid out.

The machinery, tools, etc., will have to be selected to meet individual needs as well as the appropriation available. Second hand machinery and tools can often be used to good advantage, but in most cases discarded machinery and tools have outlived their usefulness and are expensive at any price.

[A list of machinery, tools, etc., for a fully equipped reclamation plant was here included in the report. The costs given were for a guide only.]

The cost of reclaiming is the governing factor as to whether material should be reclaimed or not. In arriving at this cost all the factors should be taken into consideration; cost of handling, cost of actual work of reclaiming, interest, depreciation, etc., on the facilities which it is necessary to install to reclaim material and life of the material after it is reclaimed as compared with new articles. In many cases in reclaiming material we deceive ourselves by not taking all of the factors into consideration. What is possible to reclaim at a profit on one road is not on another, but there are a large number of items that it pays to reclaim on all railroads. In starting reclamation work, such articles should be reclaimed as valves, bolts, brakebeams, couplers, bolsters (welded with oxyacetylene), bar-iron, etc., and then work into the other items as fast as facilities can be installed to reclaim them at a profit.

Material should be classified in accordance with the Railway Storekeepers' Association classification of material, and should be carried in these classifications as recommended in the Book of Rules and distributed and handled similar to store stock. Material should be shipped direct from the reclamation plant wherever practicable; local conditions and shipping facilities, of course, will govern.

The cost of the plant will depend entirely on its size and the amount of work necessary to fit it for the work required. Wherever buildings are obtainable that are suitable for the work they should be used. However, railroads often lose sight of the savings that might be effected by having a plant built and arranged so that the cost of the work will be reduced to the lowest possible limit. The difference in cost of operation of a plant properly laid out and constructed and equipped with labor-saving devices, and one poorly laid out with inefficient equipment, will often pay for the improved plant in less than a year.

One of the strongest arguments against a reclamation plant is that there should be no need for one. It is claimed by many that material should not be allowed to get where it is necessary to reclaim it, and that by proper supervision and use of material there is no reason for a reclamation plant. However, the experience of railroads shows conclusively there is a need for one.

Prevention requires the education of the users of the material by the men in charge, and by the store department. The storekeeper must watch issues of material and call attention to all cases where the old material should have been repaired and used, return old material for new and have old material repaired locally where it pays to do so, and where it does not, send it to the reclamation plant.

Educate the users as to the value in dollars and cents of the material they are using. One of the principal causes of misuse and waste of material is ignorance of its value in dollars and cents. While there are many people in large corporations who do not care for the waste they cause, the larger percentage by far of the employees cause waste through habit and ignorance of values. Object lessons well presented are one of the best ways to educate the users of material. A good method to prevent its being necessary to reclaim material is to make it hard occasionally to obtain, thus forcing the user to help himself.

The change in patterns and designs on account of increases in size and other causes is a big factor in the waste of material, and great care should be exercised before any change.



It is necessary to reclaim a large amount of material and work it over into something else on account of not having had proper care to preserve it. A little paint on steel and finished surfaces is often the cheapest reclamation work that can be done. Material in store stock, as well as charged out material of this kind, should be given the necessary attention to preserve it. It is not good practice to store cut nuts or material with finished surfaces in places exposed to the weather.

It does not pay to reclaim material at the point of origin where it involves extra handling or expense. However, where material can be reclaimed at the point of origin at less cost than at a reclamation plant, and where it can be repaired and distributed at the same cost as at a reclamation plant, it should be done. But there is danger of duplicating work and hidden expense in reclaiming material at the point of origin.

As a rule scrap wharf facilities, as the term suggests, fall heir to what is left in the shop yard in the way of facilities. Wharves, buildings and storage bins for such purposes are usually the result of improvised and temporary structures. Many times the facilities are not only inadequate, but expensive to operate; still their general revision is delayed or prevented by the large outlay to change the plant as a whole, and for the reason that the very first preparations, which perhaps were necessary to meet an emergency, grew piecemeal until they precluded the re-arrangement for greater economy except at considerable cost. Often times unsuitable buildings have been gradually built up with which inadequate facilities the local foremen are badly hampered in their work of handling, inspecting and assorting materials for re-use, repairs or sale.

The scrap dock should be organized so it will have adequate supervision for reclaiming material, and the men sorting scrap thoroughly instructed as to what material should be saved for the reclamation plant. The supervision should constantly inspect the sorting to see that no material is being sold for scrap that can be reclaimed. The profit or loss in reclaiming material is often determined by the handling. One good way to educate is to have a sample or exhibition place where samples or the material to be reclaimed can be seen by the men doing the work, and when mistakes are made, their attention should be called to them and the exhibit also. It has also been found economical to have a schedule so arranged that shop foremen and heads of various departments are permitted to take their turn at the wharf in the supervision of the work generally.

The physical handling will depend on local conditions. This, however, is a very important item in the reclamation of material, for as a rule, excessive handling of reclaimed material will soon eat up the profit of reclamation. It should be an absolute rule that no scrap material of any kind be sold as such until it has been carefully inspected and all reclaimable material removed. Where material reclaimed can be used without any labor, it should be sent to the shipping room or proper storage room and thus eliminate all handling.

Records of car numbers and points from which material comes should be kept so that when material is put in the scrap that should not have been, the matter can be taken up with parties at fault. The scrap dock should be so designed that the reclamation plant will be located to reduce the handling of the material to a minimum. Where this is impossible under present conditions, a comprehensive plan should be drawn up, showing the ideal conditions desired, and then work the scrap dock over a little at a time until the desired arrangement is obtained.

All material reclaimed should be inspected by a competent person to see that it is in condition to meet the requirements of its use. The foreman on the scrap dock can pass on this for the material shipped direct from the dock to the work, and the foreman or sub-foreman of the reclamation plant should do so for the material from the reclamation plant. Suitable testing machines should be provided for testing certain materials and gaging them to see that they will meet the requirements. There is much to be said for and against the practice of painting and marking

material reclaimed. The committee feels that, generally speaking, material reclaimed should be painted, dipped or rattled.

[Detailed instructions and forms for handling the accounting for scrap and reclaimed material at a reclamation plant were here included in the report.]

The committee finds it impossible to make up a general statement of the saving made by the reclamation of material that would be applicable to all roads, or even to two or more roads, as conditions are so different. The saving will have to be worked up to suit individual needs for each item reclaimed. [Lists were given as a guide and to show what is being done at the present time on some of roads.]

The committee finds that the moral effect caused by reclaiming material saves many thousands of dollars. The man interested in the welfare of the company, by seeing the vast amount of material reclaimed, exercises much more care in the use of material and finds ways of using it that are cheaper than sending it to the reclamation plant.

The user of material who is careless and indifferent is checked very closely by a reclamation plant, as each individual item can be definitely traced and places the responsibility on the one that caused the loss of the cost of reclamation, thus all users of material are kept keyed up, which prevents material being discarded unless it is justified.

The report is signed by D. C. Curtis (chairman), C. B. & Q.; D. D. Cain, S. A. L.; H. S. Burr, Erie; H. Scatchard, N. & W.; R. K. Graham, A. T. & S. F.; C. H. Rost, C. R. I. & P.; J. H. McMillan, N. Y. C., and H. G. Cook, S. P.

In presenting the report, the chairman of the committee regretted that the committee was unable to include details of the Great Northern rolling mill plant, but referred to the description in the *Railway Age Gazette*, May 7, 1915, page 967.

Lantern slides were used by the committee in presenting its report.

*Discussion.*—In the discussion which followed the figure of 45 cents per cord for making old ties into engine lighting wood was questioned. The chairman explained that this figure did not cover the cost of picking up the ties on the road. Considerable stress was laid on the possibilities of reclaiming track material, particularly frogs and switches. More critical attention must be given to the subject of reclamation, as many roads are now reclaiming material which should not be reclaimed and some that never should have been scrapped.

## ACCOUNTING FOR SECOND HAND SERVICEABLE MATERIAL

By C. H. SAMSON

Assistant Auditor, Chicago, Burlington & Quincy, Chicago, Ill.

With full appreciation of the highly important part it takes in the purchase of material, there is yet reason to believe that in nothing does a store department render greater service to the company it serves than in judicious and persistent efforts to avoid purchases.

Storekeeping is many-sided and only by developing all sides in their just relation and proportions to each other will the store department as a whole take and maintain its proper place in the railroad organization. Its primary object is to secure the most economical care and use of material and in that work, accounting, in its usual acceptance, though secondary and complementary, has an important part in that it puts the results of the care and use into record form, which is of value in proportion, as it truly reflects the physical conditions and transactions.

Accounting for released material is somewhat different from other phases of material accounting in that it can be absolutely controlled in both the debit and credit, as the values are essentially arbitrary. The main consideration under such conditions is the use of values that will best harmonize with the values fixed by purchase and will be the most natural to apply. The commercial theory and practice in the handling of second hand material cannot be properly applied

to railroad accounting as the railroad is its own best customer and there is neither profit nor sense in "robbing Peter to pay Paul," which is practically the case when one account or department is allowed to take advantage of another.

Material returned to store stock is naturally divisible into three classes for which fixed bases of value can be established:

1. Usable in its present form; value, same as corresponding new material.

2. Needing repairs to make it usable; value, a fixed percentage of corresponding new material when released and full value when repaired.

3. Scrap, not fit for use or repairable; value, fixed prices according to kind.

Considering these classes in the order named, as the physical condition of released material, whether salvage or unused, fixes the class to which it should belong, it is entirely practicable for store department men to determine when an article is usable and to account for it at its proper value, without any supplementary description of its condition, as the fact that it is issued for use is evidence enough. On the other hand, if usable second hand material is handled on a percentage basis, more or less distortion of the material account will surely follow. When received, any desired percentage can be readily applied, as there is no question then as to the fact that it is second hand, but in the issue the distinction must be made on the appearance of the article, and often by the average man under working conditions. However appealing the method may be in theory, and it looks good, in practice it is both unsafe and unnecessary.

As material in stock is issued at its stock value, regardless of the current market price, so should uniformity in value of second hand material be maintained, regardless of its particular use, with only such self-descriptive exceptions as are expedient on account of values and accounts involved, and they are surprisingly few.

As material needing repairs becomes usable when repaired, it naturally follows that its value, when released, should be the usable, or new value, less a percentage allowed for repairs. Before it is repaired, it is not available for issue and therefore cannot be charged to the material class from which the repaired article will be issued. The two conditions can be satisfactorily met by charging the released value and cost of repairs to a material class designated as scrap and crediting that class at usable value, as scrap can readily absorb, in its adjustment, all differences caused by the varying cost of repairs. The greater part of scrap ordinarily is sold, so that the actual value is determined by the market, but so far as the accounting is concerned the values can and should be fixed, subject to adjustment when the sales are made.

In the three sub-divisions, released material touches many phases of storekeeping and for its efficient handling and accounting demands the closest co-operation in the physical and accounting work. An effective working plan, therefore, must not only meet the various complications with definite rules, but must have rules that fit the working conditions at the physical end.

#### RECOMMENDED PRACTICE

The committee, instead of presenting additional recommendations, feels that it is desirable at this time to call attention to the recommended practices already made by the association. Correspondence with about 50 railroads, relative to the recommended practice, shows that on the whole great improvement in the economical handling of material could be made, provided many recommended practices as outlined by the association were actually put in use by the different roads.

Due to the different methods of handling and accounting, it is impossible at the present time to make a proper comparison of the efficiency of the stores department on the various roads. The greatest fault is with the storekeepers themselves, in not forcefully bringing these practices to the attention of their own

roads, and calling attention to concealed expenses in handling material.

To properly compare the work of the stores department, we must have a common basis of arriving at the store expense, and a system of accounting which will not conceal or wrongly distribute the cost of handling material. It would appear that under the present rules of the Interstate Commerce Commission the cost of handling at least could be compared, but such is not the case. Store expense on many roads covers only the storekeepers' pay roll, practically all other expenses being charged to operating accounts. Many storekeepers do not do their own accounting. Storekeepers who actually do all the work that they should do and handle their organization properly are put in a false light by other storekeepers who only do part of the work and are only charged with a portion of the cost of handling and accounting for material.

It should be the duty of the auditing department to see that all the expenses of handling and accounting for material, no matter by what department performed, is charged to the proper account.

Attention was called to the report presented at the convention of 1914 by the accounting committee, and a paper in connection therewith; and the report of the committee on the book of rules, presented at the same convention. These two reports are so complete that the committee recommends that the association urge each member to submit them to their respective roads for adoption. The following in particular appears to be absolutely necessary to the efficient and economical handling of store department work:

The general storekeeper should have entire charge of all material belonging to the company, which is not actually in use, regardless of location. All unapplied material, new, second-hand or scrap, should be carried in his accounts and under his jurisdiction.

The accounting for all material in stock, necessary charges and distributions, including the making of vouchers, should be handled by the storekeeper and charged to store expense.

In order to arrive at honest comparisons, all labor expenses by other departments in handling material should be charged to the proper account—Material Store Expense. This will do more than anything else in placing the store department on a proper foundation.

The handling of scrap material and the sorting and reclamation of it is not properly a material store expense item and each department should stand the labor cost of the initial delivery to the store department. All labor expended by the store department in unloading, sorting, preparing for sale and loading should be charged to the value of the scrap as carried in the scrap class or account. The cost of reclamation should be charged to the article reclaimed as far as possible by the use of reclamation orders.

A classified statement of material received, issued and on hand should be made so that proper attention could be given to the different classes of material.

Disbursements should include only material actually used or disposed of; transfers between stores are not disbursements; labor in maintenance or construction of equipment should be excluded from material disbursements; material in course of manufacture, including labor expended, should be included as material stocks; temporary tracks and material suspense in connection with them should be excluded.

The importance of store delivery is not understood or appreciated on many of our railroads; consequently, it is not in general use.

While a majority of railroads operate supply cars, the greatest efficiency as regards their usefulness has not been reached. On many roads this car or cars simply distribute oil and a few light supplies. The supply car or train is the connecting link between the storehouse and the user of the material on the road, and should be the one great factor in



properly handling and delivering on the ground all material, tools and stationery required for all departments and at the same time pick up all scrap and surplus material and bring it to the storehouse.

The report is signed by D. D. Cain (chairman), S. A. L.; A. M. Gage, L. E. & W.; Clarence Foster, N. Y. C.; L. O. Genest, C. P.; J. J. Opheim, G. N.; W. A. Miller, Southern; H. C. Cook, S. P.; J. R. Mulroy, Pullman Co., and H. S. Burr, Erie.

### PIECE WORK

Previous papers and committee reports have fully outlined the advantages to be derived from the piece work system; have shown how to install and maintain the system; provided forms for records, and have also given a few concrete examples of economies which can be effected. There has seemed lacking, however, information as to the compilation and phraseology of the schedules, and this feature the committee has endeavored to cover in this report on a limited scale.

In making up a piece work schedule it should first be properly classified. The scrap dock employees would not be interested in schedules for handling lumber, nor does the ice house force care anything about schedules for handling rail and track material; hence it is recommended that the schedule be compiled in sections so that each shop or yard can be furnished that portion of the schedule which affects the work it has in hand.

It is not expected that the classification given will suit all cases, but should be modified to cover conditions as they exist in each individual case. The classification of the schedule is as follows:

Concrete products—manufacturing and handling; ice; lumber, switch ties, piling, poles and posts; miscellaneous storehouse material; rail and track material; scrap and reclamation material; signal material; tools and machinery; track ties and tie treating chemicals.

Schedules under the various classified headings should be arranged in numerical and alphabetical order. The heading "Miscellaneous Storehouse Material" may be sub-divided to suit conditions. One alphabetical index should cover the complete schedule.

[Examples were included in the report showing the method used in preparing the schedules.]

The following instructions should constitute a preface to each copy of the schedule.

All work unless otherwise specified is to be done by hand. Derrick prices and machine work includes all work, fixing tackle and machinery and doing the necessary switching, as well as transferring from previous jobs unless otherwise specified.

Loading includes getting material from the storage place, placing in the car, and properly blocking it for shipment unless otherwise specified.

Unloading includes taking from the car to the storage place, inspecting, taking out culls and properly piling or placing in racks or bins, unless otherwise specified.

Prices per "job" or per "trip" for derrick or hand work are to be paid only when it requires the extra switching or trips for the work. They are not to be paid when it does not require extra switching or trip and when the work can be done in connection with other work.

Rubble car prices include all handling of car to and from work, unless otherwise specified.

The report is signed by W. W. Eldridge (chairman), C. B. & Q.; B. W. Griffith, N. Y. C.; Geo. Holmes, M. C.; W. H. Thorn, C. St. P. M. & O.; F. J. McMahon, N. Y. C.; J. A. Stewart, N. Y. O. & W., and W. E. Brownell, Lack. Steel Company.

*Discussion.*—It developed that only a few roads are using piecework in the stores department, but that these few are well satisfied with the results which are being obtained. The Chicago &

North Western finds a considerable increase in the work accomplished, and no neglect of inspection. More supervision is needed with piecework. Rates should not be cut when a man's earnings increase.

### ACCOUNTING—MATERIAL STORE EXPENSES

In recommending rules governing the accounting for material store expenses, the committee sets forth the principal and general expenses which are concerned and connected with store department operations. In the purchasing department, material store expenses are chargeable with the pay of general and local purchasing officers and their assistants and employees of the purchasing department; also, their traveling, office and other expenses incurred in purchasing material and supplies. The two exceptions are amounts expended for purchasing stationery, which are chargeable to stationery store expenses; and pay and expenses of officers and employees engaged in purchasing a single class of material or supplies, such as ties or fuel, which are chargeable directly to the cost of that material or supply.

[Similar analyses of the charges against material store expenses are given for storekeeping, inspection, switching service, motive power and car departments, maintenance of way department, construction department, handling supplies for, and products from, company industries, handling rail and ties, handling ice, handling bridge material, signal material, structural steel, etc., shipped direct to jobs, handling scrap, and accounting.]

In the application and distribution of material store expenses, percentage rates, representing material store expenses, should be assessed according to the issues. The percentage should remain in effect until conditions may warrant a change, which may be made monthly or otherwise during the fiscal year.

Material store expenses are chargeable on the value of material issued for construction and additions and betterments, as well as for operating expenses; they are not chargeable in connection with transfers of material and supplies as between stores and stock accounts.

Material store expenses are chargeable on the value of the gross issues from stock, regardless of the value of scrap and second hand material released and received in exchange; they are chargeable on the value of the material issued to the shops for the manufacture of goods on store department orders and are also chargeable on the value of all shop manufactured goods issued from store stocks. Material store expenses should be assessed on the value of material and supplies sold from store department stocks.

A ledger account entitled Material Store Expenses should be established, for the specific and exclusive purpose of providing a suspense account through which to clear all debits and credits appertaining to the operation of the store department. This account should be credited with the amounts accruing from the application of the percentage for material store expenses to the value of goods issued. The balance in the account, if debit, would represent undistributed expenses due to the prescribed percentages being insufficient to clear the account; if credit, due to the prescribed percentage being greater than the percentages that would have cleared the account.

The account should be cleared in June account of each year by using for the prescribed percentages the rates of per cents that the actual expenses bear to the actual total material issues for the month.

Stationery store expenses should be handled separately from, but similarly to material store expenses.

The report is signed by P. J. Shaughnessy (chairman), Erie; E. L. Fries, U. P.; H. H. Laughton, Southern; E. E. McCracken, B. & L. E.; D. A. Williams, B. & O.; Chas. I. Davis, D., L. & W., and J. W. Camp, B. & M.

*Discussion.*—The discussion centered largely on the charging of expenses for the handling of scrap. In this respect the report

conflicted with the reports on Recommended Practices and Reclaiming Material, and was finally amended to agree with them.

### STATIONERY

Stationery is material and supplies. The cash values of such supplies is about 4 per cent of all other supplies, with the exception of fuel, rails and ties. Owing to the nature of the material, and the comparatively small unit value, the percentage of cost in buying, handling and accounting is much higher than in the case of other material.

In the handling of stationery, there is the same lack of uniformity of methods prevailing as is the case in the handling of other material. On some roads these supplies are handled by a special department, under a stationery agent; on others, by the general stores. On some roads the stationery supplies are charged out in detail as issued, while on others no detail charge is made, but the total cost is apportioned to the various departments on a percentage basis. There are also many different methods of handling the requisitions on which the stationery is issued.

When stationery is handled by a separate organization, under a stationery agent, the head of the organization is usually the buyer, or purchasing agent for the material, as well as the storekeeper. The one strong point in favor of the separate organization is that it is complete in itself, and there would seem to be a good prospect of eliminating much of the correspondence and referring back and forth that would take place if the stock were maintained by one department, and the buying done by another.

On the other hand, the committee finds many weak spots. In the first place, the organization, to be efficient, must be complete in its ordering, receiving, storing, distributing and accounting for, and this means the maximum of cost. Then the head of the organization, being the buyer, or purchasing agent, is so taken up with the buying that the more important end, the distribution, is neglected by him, this work being largely delegated to members of his staff, who are rarely men of wide railway knowledge. One reason for this is that executives seem to have the idea that the handling of stationery, because it is largely paper, pens and pencils, is boys' work, and we should pay boys' wages. Boys can be used in this work to an extent, but supervision must then be better than ordinary, which has not been found to be the case in separate stationery organizations.

The weak spot in the handling of the stationery supplies by the stores department is that the buying may then be done by a purchasing agent removed from the stores, and much unnecessary correspondence and referring back and forth is entailed.

The strong points in favor of the handling of stationery by the stores department are: An organization for the handling of supplies and material, ordering, receiving, storing, distributing and accounting for. The receiving clerk or clerks of this organization can receive stationery at less additional cost than can a department created for that purpose alone; the porters who handle general supplies can handle stationery supplies at less additional cost than can porters who are maintained for that purpose alone; the distributing force which distributes general supplies can distribute stationery supplies in addition to general supplies at less cost than a force maintained for that purpose alone; the accountants who handle accounts for general supplies can handle the additional accounts for stationery at less cost than can accountants maintained for that purpose alone. All of these men having wider general training than would men handling stationery only, should do the work better.

The committee finds it impossible to make a fixed rule that an ordinary railway should carry so many dollars worth of stationery stock per mile of road operated, because of a lack of uniformity in practice. The figures that mean one thing on one road, mean an entirely different thing on another road. For instance, on one road the stationery stock figures cover the folders, tariffs, tickets, adding machines, typewriters,

advertising matter and the postage stamps, while on another road they cover some of these, and on others, none of them.

However, leaving out the items mentioned above, any road having stationery stock that goes beyond ten dollars per mile of road, counting double track as single main line, and counting main line only, would do well to look into the matter.

The conclusions arrived at are:

(1) That the handling of the stationery should be done in connection with the general stores.

(2) That stationery should be charged out in detail, the same as other material and supplies.

(3) That while the receiving, accounting and shipping facilities of the stores be made use of in the handling of stationery supplies, the stationery should be a department by itself within the stores, to the extent that the stationer devote his whole time to stationery matters, and that he be the stationery buyer. In no case should the general storekeeper be called on to do the buying.

The stationery organization should be a part of the regular store organization under the general storekeeper, the staff to consist of the stationer, stenographer and stock room man, with the necessary help to handle the stock, according to the size of the road. Requisitions for purchase of stock supplies should be made up by the stock man, checked by the stationer and approved by the general storekeeper for purchase.

The stationery stock room should be of ample size and laid out in sections; a section to accommodate the forms belonging to each department, and a miscellaneous section to care for forms and supplies common to all departments. There should be a catalog of stationery made up in cheap form, so that it could be renewed at small expense, and a copy of this catalog placed in each office. The catalog should be made up to correspond to the stock room.

Each department should have its own series of numbers and symbols. Thus, the motive power department would be given 1 to 200, and its forms would bear its number and letter, thus—F. 160 M.P. Miscellaneous should have its own number and letter M. Each section should be marked with a small sign, as "Motive Power 1 to 200," and the pigeon holes, or shelves, numbered for the forms placed in them. In addition to the shelving for forms there should be, of course, a sufficient number of cupboards and drawers to hold the other material and supplies. The one thing absolutely necessary about a storeroom is that it be big enough.

In each department of the catalog there should be blank spaces for new forms. The stock man should have a copy of the catalog always on his desk. As a new form is gotten out, he should write it in its proper place, and as an old one is discarded, he should strike it out. This working copy should go to the printer, and from it the new issue should be struck. If this occurred too often, notice of a new form could be sent out, and each office could enter it in writing in its copy. If this was done on a fully organized road, a new issue of the catalog would be needed only once in five years.

The requisitions for supplies of stationery should be approved by the head of the office requiring them, and sent direct to the general storekeeper, and from him to the stationer to be filled. The real checking of the requisitions should be made by the man filling the requisitions. Requisitions from agents should go direct to the storekeeper without approval by superintendents or others.

A carefully prepared list of all stations and offices should be kept in the storekeepers' and stationers' offices. This list should show the number of employees in each office, and any other particulars that might be a guide to men filling requisitions. Stationery supplies should be delivered by supply cars as far as possible.

At stocktaking, the stationery supplies in all offices should be carefully checked, and all surplus or dead stock returned to the stores. It is at stocktaking time that the careless and extravagant man is located.

Requisitions for new forms should be special, accompanied



by a full description of the form and an explanation of why it is required. Multiplicity of forms is a great evil, and additions to the number should be most carefully watched. This should be part of the duty of the stationer. Under this plan he will be relieved of such duties as accounting and distributing, and he should devote his whole time, apart from buying, to the study of standardization and uniformity of blanks, as well as grades and weights of stock.

The report is signed by E. J. McVeigh (chairman), G. T.; C. H. Rost, C. R. I. & P.; R. C. Crosby, Wabash; O. T. Burleigh, B. R. & P.; N. C. Foss, Ann Arbor, and R. A. Weston, N. Y., N. H. & H.

**Discussion.**—There was considerable difference of opinion as to whether this department should come under the storekeeper or not. One member stated that he had found economy in sending the stationery out in small packages rather than by the supply car.

### SUBSTITUTES FOR EXPENSIVE LUMBER

By W. H. CLIFTON

Lumber Agent, Baltimore & Ohio, Baltimore, Md.

As in other lines of industry, there are certain practices which are followed in the use of lumber in railroad shop and building work today, which have been unchanged for many years, regardless of the decrease in the supply and increase in the cost of the lumber used, or the fact that other kinds of lumber, equally well adapted to the purpose, are more easily and cheaply obtained. This condition seems to be due largely to a lack of knowledge of the characteristics of materials, other than the ones which have always been used for certain purposes.

There are many occasions when 1 in. by 12 in. by 16 ft. white pine of good grade is ordered when 1 in. by 8 in. by 12 ft. to 16 ft. yellow pine, cypress, spruce or even hemlock of a lower grade would answer equally well for the purpose, and would cost considerably less. White pine for pattern work is frequently ordered to be 12 in. and over in width, when, if ordered 8 in. and over with a limit on the percentage of widths under 12 in. acceptable, the lumber would cost less, and the widths under 12 in. will usually be found, piece for piece, to be of better quality than the wide stock.

Not very long ago, while passing through a cabinet shop in a railroad mill, I observed a large number of boxes or trays of a peculiar design in the course of manufacture. The boxes were being made from clear yellow poplar and were heavily ironed, and, I think, were mounted on small truck wheels. Upon inquiry, I was informed that they were to be used as tool boxes by machinists and car repair men for keeping together their wrenches and tools, and for moving them from one job to another. Now, when those trays were finished, they were beautiful to look upon, the bright yellow of the heart poplar standing out in contrast to the black iron branches, but the first time a car man threw his 18 in. wrench or his iron jack lever against the side or end of one of those boxes, an abrasion would appear in the soft surface of the wood in which one might lay a finger, and in a very short time the body and partitions of the box would be gone. Yellow pine or oak would have been a more durable material, and would have cost approximately 50 per cent less than the poplar, but the force in that shop knew little about yellow pine, except that it was more difficult to work, being harder in texture, and, I believe, they considered oak too heavy; but they did know poplar and white pine and no doubt figured that, if it was good enough for cab panels and coach siding, it was good enough for the tool boxes.

The storekeeper did not use those tool boxes, but he supplied the stock to make them, and, perhaps, accepted the boxes in his stock and issued them. He is interested to the extent that, when the practice of using such expensive material for ordinary purposes is discontinued, he will have to carry less of it in stock and his stock balance will drop proportionately.

Noting, about a year ago, that a certain shop was ordering very frequently 1 in. by 16 ft. No. 2 white pine barn boards,

inquiry was made as to the purpose for which they were used. Among other things, it was learned that quite a large quantity of the boards were being ripped to 2 in. and 3 in. strips and shipped out on the line for staying explosives in shipments and for stripping powder cars. Hemlock and chestnut cut to the desired size is now being purchased for this use at a cost of \$18 to \$20 per thousand feet. The white pine cost \$27 to \$32 per thousand feet. Old car siding and other waste material is also being used.

On two occasions, at different shops, it has been found that track shims were being made from new white oak purchased for gondola flooring, and, while it must be admitted that the shims were excellent and the size of the flooring was well adapted to the method of manufacture, little progress was being made toward economy, which would have been possible by cutting up odds and ends and obsolete sizes of material, of which there was a considerable quantity available at both shops.

The cases mentioned are not exceptions, and are not peculiar to any one shop or railroad. **Similar cases can, no doubt,** be found to exist on many roads. The condition is the result of practices in effect when high grade lumber was cheap and plentiful.

A remedy is not hard to find or difficult to administer. Usually a little educating of the consuming forces in the possibilities of substituting, with a view of economy, brings the desired result, for the average mechanic on a railroad is not averse to saving money for the company if some one will show him how to do it and co-operate with him in accomplishing the desired result.

Some of the railroads have already gone quite extensively into the substitution of cheaper and more plentiful lumber. The Chicago, Milwaukee & St. Paul has found Douglas fir of suitable grades at a price ranging from \$26 to \$30 per thousand feet, and Washington cedar at \$30 to \$37 per thousand feet, to be excellent substitutes in many cases for soft yellow poplar at \$65 to \$90 per thousand feet. Both fir and cedar can be obtained in any width and thickness desired and can be satisfactorily kiln dried. While this company still uses yellow poplar for outside siding and interior finish on passenger cars, it has been able to cut the consumption of poplar to about 35 per cent of the quantity formerly used. It has also been found that clear red birch is an excellent substitute for mahogany for seat arms, etc., and at a considerable saving in cost.

The Baltimore & Ohio has very recently taken up the question of substituting red or gulf cypress for purposes for which soft yellow poplar has been used. For all purposes in which substitution has been made it answers equally as well as poplar, and, in some cases, it is superior to poplar for the purpose.

The following comparison of the approximate prices of first and second clear soft yellow poplar and the same grade of red or gulf cypress will give some idea of the saving which will be effected:

#### APPROXIMATE PRICES, F. O. B. CARS, CINCINNATI, OHIO

First and Second Clear Soft Yellow Poplar		First and Second Clear Red or Gulf Cypress	
Thickness	Price	Thickness	Price
1 in.	\$50.00	1 in.	\$43.00
1 1/4 in.	55.00	1 1/4 in.	43.50
1 1/2 in.	52.50	1 1/2 in.	43.00
2 in.	55.00	2 in.	46.00
2 1/2 in.	60.00	2 1/2 in.	56.50
3 in.	65.00	3 in.	57.50
4 in.	68.00	4 in.	62.50

The specifications of the Baltimore & Ohio call for poplar 7 in. and over in width and 8 ft. to 16 ft. long; shipments must average 12 in. or over in width and 50 per cent of the boards must be 16 ft. long; only 10 per cent of 8 ft. and 10 ft. boards are admitted. The cypress can be purchased the same way.

It was formerly the practice on this road to use poplar for blocking in between the framing of baggage, mail and express cars to provide a soft absorbent surface to which glue is applied in putting on the outside sheathing. After a trial,

it was found that a sound wormy grade of chestnut, kiln dried, could be used for this purpose with as good results as obtained from poplar. The chestnut cost approximately \$20 per thousand feet; the poplar cost \$55 per thousand feet.

Of course, steel is rapidly taking the place of lumber in car and locomotive work, and the possibilities of substitutions of cheaper woods in that class of work will grow constantly less, but there is on most railroads still a large amount of wooden equipment, which will be rebuilt and kept in service for years to come.

#### OTHER BUSINESS

J. H. Waterman, superintendent of timber preservation of the Chicago, Burlington & Quincy, presented a paper in which he suggested that the storekeeper should examine critically all requisitions and substitute cheaper material if it was just as satisfactory.

The above covers the proceedings for Monday and Tuesday of this week. The remaining sessions will be reported in next week's issue of the *Railway Age Gazette*.

A report on the Uniform Grading and Inspection of Lumber was presented on Tuesday, an abstract of which will also appear in next week's issue.

#### SOUTHERN PACIFIC EMPLOYEES GIVEN PRIZES FOR SOLICITATION OF TRAFFIC

The Southern Pacific has recently awarded cash prizes to 24 of its employees on the Pacific system in the contest for the personal solicitation of traffic between May 1, 1912, and December 31, 1914. The contest was open to every employee of the company except those traffic representatives and agents whose regular duty it is to solicit traffic.

Prizes of \$25, \$20 and \$15 were awarded on each of seven divisions and in the general offices, and in addition special prizes of \$25 each were given to R. W. Dodd, rate clerk in the general freight department, and H. E. Landerkin, rate clerk in the general passenger department, whose records were considered worthy of special consideration since their duties had not placed them in contact with the public. Each of the 10 divisions on the system was constituted a group and two groups were made up of the general offices at San Francisco, Portland and Los Angeles. Prizes were offered to each group to be based on a system of credit units, and it was necessary for contestants to obtain at least 50 credits to qualify. Failure to do so accounted for the fact that no award was made in four of the groups. In the plan of credit rating 40 credits were allowed for each carload shipment secured by unaided effort for transcontinental shipment and 20 credits for other shipments. Twenty credits were allowed for transcontinental carloads reported and secured with the assistance of a traffic department solicitor and 10 credits for other shipments. Five credits were allowed for each carload prospect reported but not secured. Half as many credits were allowed for l. c. l. shipments. Forty credits were allowed for transcontinental passengers secured by unaided efforts and 10 for each other passenger secured by unaided effort. For each passenger reported and secured with the assistance of a traffic department solicitor, 20 credits were awarded for transcontinental passengers and 5 for other passengers. For each transcontinental passenger reported but not secured 5 credits were allowed. Special credits were allowed for large party movements, such as conventions, etc.

A similar contest is now in effect to close on June 30, 1915. Personal solicitation cards are furnished to the employees on request and when a prospective shipper or traveler is obtained the employee forwards the card properly filled out to the nearest district freight and passenger agent. The latter then calls on the prospect and closes the canvass, returning the card to the general office with a notation on it as to what business resulted.

#### RAILWAYS MUST ABANDON CONTROL OF BOAT LINES ON THE GREAT LAKES

The following is an abstract of the Interstate Commerce Commission's decision, written by Chairman McChord, in the case entitled "Lake Line Applications Under Panama Canal Act" (33 I. C. C., 699), refusing the petition of the rail carriers to retain control of their boat lines on the Great Lakes.

The several lines concerned are as follows: The Anchor line, the Erie & Western Transportation Company, is owned by the Pennsylvania and operates 12 vessels serving Buffalo, Erie, Cleveland, Detroit, Mackinac Island, Milwaukee, Chicago, Sault Ste. Marie, Marquette, Hancock, Houghton, Superior and Duluth. The Mutual Transit Company, owned by the Mutual Terminal Company, which in turn is owned jointly by the Lehigh Valley, the Erie, the Lackawanna and the New York Central, operates 12 vessels serving Buffalo, Fairport, Cleveland, Gladstone, Green Bay, Duluth, Houghton, Hubble, Fort William, Port Arthur and Westport. The Lehigh Valley Transportation Company is owned by the Lehigh Valley and connects with it at Buffalo. The Western Transit Company, owned by the New York Central, operates from Buffalo to Chicago and other Lake Michigan and Lake Superior ports. The Rutland Transit Company, owned by the Rutland Railroad, which in turn is controlled by the New York Central, runs boats between Ogdensburg, N. Y., and Milwaukee and Chicago. The Canada Atlantic Transit Company, owned by the Grand Trunk, operates three steamers between Depot Harbor on Georgian Bay and Chicago and Milwaukee. The Erie Railroad lake line, operated by the Erie, operates between Buffalo and Fairport and Milwaukee, Chicago and Manitowoc.

The commission finds that there is or may be competition for traffic between the vessels and the railroads interested in them within the meaning of the Panama Canal amendment.

There are no cases where any two ports are served in common by the boats and by the paralleling rails of the particular owning railroad entity. In the case of the Pennsylvania, the New York Central, the Erie and the Grand Trunk, however, the railroad entity owning the boats or the interest therein also owns, or has an interest in, other railroad entities whose paralleling rails do serve ports in common with the boats. The interest existing between the several portions of each of these systems and the several boat lines in which it is a stockholder is the kind of interest which the act was intended to reach.

The Lehigh Valley and the Lackawanna are each parties to through all-rail routes and joint rates to all the ports served by their boats. They are members of various fast freight lines, and are also interested in the Lake Line Association organization, the records of which indicate that its function is to insure a "proper" management of the boat lines from the viewpoint of the railroads. While the two roads may not directly compete with their boat lines, their membership in this association or participation in any like understanding places them in a position inimical to the best interests of their boat lines. Placed in such an attitude these roads, through the agency of other roads, with which they are "partners," become the competitors of their own boat lines. What is here said with special reference to the Lehigh Valley and the Lackawanna also applies to the other roads.

That the existence of paralleling through all-rail routes, which the petitioning railroad forms a part of, brings an application under this amendment within its provisions, seems clear when the amendment is considered in its application to the railroad interest in boats using the Panama canal. Neither at the time the amendment became a law, nor now, is there any transcontinental rail line owned or operated by a single railroad or system of railroads in the United States.

The words of the law are as follows:

If the Interstate Commerce Commission shall be of the opinion that any such existing specified service by water other than through the Panama Canal is being operated in the interest of the public and is of advantage to the convenience and commerce of the people, and that such extension will neither exclude, prevent, nor reduce competition on the route by water



under consideration, the Interstate Commerce Commission may, by order, extend the time during which such service by water may continue to be operated beyond July 1, 1914.

The commission finds that it is not in the interest of the public that the rail carriers should continue their control over the lake lines.

It is the opinion of the commission that the purpose of the Panama Canal Act is to preserve to the common interest of the people free and unfettered the "water roadbed" via the Panama canal, and with respect to waters "elsewhere" to restore all the water routes of the country to the same condition of freedom from domination that would reduce their usefulness as a natural means of transportation. Congress has decreed that there shall be a restoration of conditions which prevailed when railroads had no interest in and exercised no control over the boat lines plying the country's water routes. That the legislation might not be arbitrary certain provisions were made so that in given instances which form exceptions to the usual experiences in cases of joint ownership such ownership may be continued. It is not found that the cases at issue constitute such exceptions.

The petitioners have contended that the control of the lake lines by the rail carriers results in responsibility and regularity of the service. They allege that the joint ownership results in greater economies, particularly from the standpoint of terminals. They note that certain of the boat lines are being operated at a loss and that only the greater financial strength of the owning railroads enables them to operate.

The commission agrees that no doubt under joint operation certain economies can be effected, but that these economies have not manifested themselves in a reduced lake-and-rail transportation cost to the public. On the contrary there have been advances. These successive advances have had the effect not only of preventing an increase in lake line tonnage, but in diverting from the lake routes to the all-rail lines, part of the tonnage which formerly moved on the lakes. Furthermore there is much reason to believe that the very purpose of these advances in lake and rail rates was to divert tonnage to the all-rail lines. As a direct result, the boats have operated with small cargoes, although their operating expenses were almost as great as if they had been fully loaded. This has in turn resulted in a high operating cost per unit of freight. The commission believes that this policy fully explains the lake line deficit and that such facts make clear that whatever economies might be realized by joint ownership are offset by the waste resulting from the unfair use of vessel tonnage in the interest of the owning railroads. The railroad control of these boat lines cannot be said to be in the public interest when the policy of these railroads has been by an artificial rate structure to deprive the public of the natural benefits that would flow from a free use of this waterway.

There are no instances where the boat lines have actively competed for traffic with one another or with the paralleling railroads under the regime of joint operation. Under independent operation each of the lines, in order to survive, will become a competitor of every other boat line and of the paralleling railroads, and the result of such operation will be reflected in the character of service furnished and in the rates. There will be a considerable advantage, moreover, in that these various boat lines, when independently operated, will be able to make through routes and joint rates with the boats which will be operated on the Erie canal barge lines.

These boat lines under the control of the petitioning railroads have been first a sword and then a shield. When these roads succeeded in gaining control of the boat lines which had been in competition with paralleling rails in which they were interested, and later effected their combination through the Lake Line Association, by which they were able to and did drive all independent boats from the through lake-and-rail transportation, they thereby destroyed the possibility of competition with their railroads other than such competition as they were of a mind to permit. Having disposed of real competition via the lakes, these boats are now held as a shield against possible competition of new independents.

Since the railroads are able to operate their boat lines at a loss where there is now no competition from independent lines, it is manifest that they could and would operate at a further loss in a rate war against independents. The large financial resources of the owning railroads make it impossible for an independent to engage in a rate war with a boat line so financed.

The commission from a consideration of the above facts denies the petition of the carriers to retain control of the boat lines, effective, December 1, 1915, and an order has been made to that effect.

## FRANCE SAVED BY HER RAILROAD MEN

BY WALTER S. HIATT\*

One of the big achievements of the war in Europe has been the handling of the transportation situation by the railroads. One general has called it "a war of railroads" because of the vast role played by them in getting troops, provisions and munitions, to the front and on time, the victory being with the army that gets first to a critical point. The often quoted remark of Napoleon, "an army is as strong as its feet," has been adapted to read: "An army is as strong as its railroads."

Every railroad man today knows that Germany has been able to keep up a remarkable fight on her two frontiers by her government owned military railroad system which enables her to shunt the same troops back and forth from one frontier to the other. It is not known that the French railroads have rendered an equally great service in France and at the same time, with the exception of the first two weeks of the war, practically continued on their regular schedule for civil passengers and commercial freight. And all this wonderful work has been done without any noteworthy accident, and it has been done with a constant rerouting of large numbers of troops and war material to meet new battle conditions on a front 940 kilometres (584 miles) long, from the English channel to the Swiss frontier. It has been done with a decrease of rolling stock, in the face of an ever-decreasing coal supply, and always with the same or a smaller number of railroad men.

During the critical period from August 1 to 20 last, no less than 1,800,000 soldiers were gotten to the front, and each of these soldiers was handled three times, so that in reality 5,400,000 troops were delivered at the required points. While these troops were being moved, while possibly 5,000,000 of the civil population was also traveling, while two armies were being hurried into Alsace and Lorraine to begin a double campaign to turn the German army heading for Belgium, on August 3 a special train was provided to conduct the German ambassador, M. de Schoen, to Berlin. No, there was no panic among the railroad employees, there was no breakdown of the French railroad system.

When I got off a ship at Bordeaux lately, the service of which ship, as of all other ships and of all steamship companies, had been seriously interfered with because of the war on land, I expected all sorts of difficulties in riding to Paris, such as slow and dirty trains, frequent side-tracking to permit troop or hospital trains to pass. Right at the very dock, however, I found a railroad agent, as at any American port, ready to sell me a ticket, to assure me that the trains were making fast time, and to check my baggage, both my trunks and that part which I sent by the slow and cheaper method known as "la petite vitesse." At the station I noted a great many soldiers, a huge number of hospital automobiles for the wounded, and a large number of civilian travelers. The usual ticket-taker stood at the platform entrance, with a brassard on his arm to indicate that he was under military service. Beside him stood two red-trousered soldiers with their guns bayoneted to check the coming and going of all travelers, both civil and military. The man who carried my baggage wore the sleeve brassard. He, too, was in the military service.

I was surprised that I could take my choice during the day of no less than four fast trains to Paris, any one of which would

\*Our special European correspondent.

make the run in the usual eight to nine hours. Yet when I entered my train, before it pulled out, I counted no less than three long hospital trains pulling in, within the space of a couple of minutes each, and each filled with wounded troops, the men sitting or lying, according to the nature of their wounds. Had I been a blind man, the only sign of the war would have been the wet cushion which I happened to sit on. It was stained red with blood from some wound that had broken. Doubtless the car in which I was to ride had but lately come in with some of the wounded and had been made up into the fast passenger train after a hasty cleaning.

I was surprised at what I saw because I had just finished reading a new book telling how the railroad system of France had broken down, and right from the beginning of the war. So well posted a man as C. W. Barron, of Boston, who wrote this book on the financial aspects of the war, stated that last August the railroad men of France were actually taken from their regular posts of duty and mobilized by regiments, and that but for the motor-busses of the Paris street passenger service carrying troops to meet the Germans, Paris would have been taken. While Mr. Barron's book is otherwise full of good information, in this respect it is incorrect. The statement is in line with many made by persons possessed with the bogey of German efficiency.

Already in France the extraordinary service rendered by the railroads is acknowledged, and in time, I am informed, certain of them—the privately owned—will be decorated with the Legion of Honor cross. In France there are six large railroad systems, two controlled by the state, and four by private companies, the latter comprising 30,000 of the 36,000 miles of single track; on these latter has fallen the brunt of war transportation, because of their geographical positions. It is true that these railroads were not fully prepared for war on such a scale—nobody on earth was fully prepared for that matter—and it is to their credit that they have met bravely and efficiently these unusual conditions, just as do our own railroad men in time of flood or wreck.

It is not denied that the motor car and the motor-bus have and still are rendering a large service. However, it borders on the ridiculous to imagine for a moment that the tremendous transportation work of a railroad has been or can be done by such means. When the truth is told about the way the French troops were launched against the Germans, that resulted in the battle of the Marne, it will be found that it was not so much the few thousands of men hauled in the motor-busses out of Paris but the men of the army of General Manoury that routed the Germans. This army was hastily concentrated at Reims, thanks to the railroads, and so rapidly collected that the German spy and information system did not know of its existence.

I am not judging railroad efficiency of the early part of the war by what I saw in my travels through France lately or of what I saw at the big Paris terminals, where the trains are now moving as quietly and smoothly as in peace times. Not only old railroad men but disinterested travelers during that mobilization period of early August tell me the work was inspiring. Consider the conditions. Every day, beginning with July 26, when the war cloud began to blacken, tourists began to rush to and fro, some to seaports, some inland to their homes, and each day their panic grew. During this first week the trains were doubled, then tripled. No less than 500,000 extra passengers came to or passed through Paris, the railway center of France, and no less than 200,000 of the foreign population left Paris. On July 31 the older soldiers of the reserve army, then as now assigned to the guarding of roads and railroads, began to arrive at railroad depots and add to the crowds. The next day at 5 o'clock all the railroads, which had so far done their work as civil instruments, came under military law.

Did the railroad men lose their heads when this mobilization was declared? When hundreds of thousands of troops began to move from every city and town and farm of France to their appointed place to join their regiments, when other hundreds of thousands of civilians began to fly hither and thither, the railroad men quietly put on their brassards and continued at work.

An old lady who was at that hour struggling on the crowded Paris platform of the Paris-Lyons-Mediterranean, waiting to get a train for Toulon in the far south, and there say goodbye to her son joining his regiment, lately told me she saw the railroad men moving huge trucks of rifles along the platform, going about their business through that excited crowd in the matter-of-fact way of railroad men in emergency the world over. Yet these men had perhaps been without sleep for several nights. It is true that it took this lady sixty hours to reach Toulon instead of the usual sixteen, but she got there. The wonder is that any civilian trains were permitted. As it was they were only side-tracked while the military trains passed, moving at an average rate of forty miles an hour.

One of the amazing feats of the railroad men was the changing, over-night, of the time tables on every one of the six systems. These time tables were changed to a new schedule accommodating from 140 to 160 trains a day. Every station master was notified by telegraph when trains were due at his station. No less than 200,000 messages of this import were sent in a single day.

During twenty long, hot, murderous days, ten thousand trains were kept in motion throughout France. Happily, not all of these trains moved towards the frontier at the same time. Yet, to the complexity of the general forward movement was added that of first carrying the men to their regimental depot. Neither a regiment nor a division is moved all in a piece, like an excursion party. A soldier living in Paris may have to go first to some relatively distant station in the country where he joins his regiment, is armed and equipped, and then moved with his regiment to the headquarters of its army corps in another place; and finally the army corps is moved to a point on a main line and thence to some place at the front, either in the north or the east. A man working in Reims may have to join his regiment at Toulouse in the south, thence to a military camp, and finally to Verdun in the east. What these 10,000 trains began to do in August they have been doing ever since, for the other millions of newly recruited men, or for the shifting of armies to new battle regions.

One must have seen the handling of an army corps to get an idea of what work these inoffensive-looking French trains have accomplished and still are accomplishing. Let railroad officers who have sweated over a 100-car circus movement consider that any heavy movement of troops is made by army corps, and that an army corps consists of no less than 39,000 men, all told; and that to boot there are cannon, horses, kitchen equipment, engineers' equipment, wagons, aeroplanes, ammunition boxes, provisions—enough things to make the moving of a train-load of wild animals seem tame in comparison.

It takes two trains of fifty cars each to transport the men of an infantry regiment. This regiment is subdivided into three battalions of 1,000 men each, and each battalion into four companies. The military end of the affair is easy. Get your cars there and the soldiers, company by company, hop in quickly, without any confusion. Your cars for the infantry regiments are easily gotten rid of. But you need an extra hundred cars to carry nothing but the immediate infantry equipment—mitrailleuse guns, regiment wagons and odds and ends of baggage.

Then you need another extra twenty trains for the artillery of this army corps. Only one cannon can be set on a flat-car, including its limber. About fifty cars are necessary for each regiment's cannon. Next there must be cars for the horses that drag the cannon, cars for the artillerymen, and for all the other equipment that goes with cannon.

If the cavalry regiments travel with the army corps, the job is still worse, as no less than 6 trains of cars are necessary for one cavalry regiment. Add to these trains the ones required by the commissary, the hospitals, the heavy artillery, the trench diggers, the bridge builders, and no less than 70 trains of fifty cars, or about fifty big circuses, are necessary to move an army corps. And the French railroads, if you please, had to move no less than 42 army corps in twenty days.



# Commission's Findings Relative to the Cummins Law

## That Full Liability is Demanded by the Statute Does Not Allow the Carriers to Increase Their Rates

Following is an abstract of the Interstate Commerce Commission's finding relative to the Cummins amendment, the language of the commission being preserved in so far as possible.

For many years, if not, indeed, from the origin of railroad transportation in this country, common carriers have sought in various ways to limit their common-law liability. One method was by a so called release, executed by shipper and carrier, and intended to be effective whether the loss or damage was due to negligence of the carrier or to other causes.

The Carmack amendment of June 29, 1906 made the initial carrier responsible for the safety of goods through to destination. Since that time, beginning in 1913 with *Adams Express Company v. Croninger*, 226 U. S., 491, the United States Supreme Court has decided in a number of cases, that where the shipper has his choice of two rates, the higher carrying unlimited carrier's liability, and in "a fair, just, and reasonable agreement," declares that the value of his shipment is a certain sum and thereby secures a reduced rate, he is bound by that declaration.

The Cummins amendment (an abstract of which was given in the *Railway Age Gazette* of March 12, page 482) was approved March 4.

The Official Classification provides different rates and forms of bills of lading to be used at the election of the shipper, so that the consignor may have the option of shipping subject to the terms of the uniform bill of lading, or under a receipt by which the carrier accepts unconditional liability. Under this rule property is carried at the normal tariff rates if shipped subject to all the conditions of the uniform bill of lading. Property carried not subject to all these conditions is taken at the carrier's liability, but at a rate 10 per cent higher. The Western classification also contains provisions substantially similar. The Southern classification contains a similar rule, and also provides that the rates on livestock will apply when the declared value does not exceed certain values therein stated and that for each increase of 100 per cent or fraction thereof in the declared value there will be an increase of 20 per cent in the rate.

It is plain that the purpose of this law is, except as otherwise provided, to invalidate all limitations of carrier's liability for loss, damage, or injury to property transported caused by the initial carrier or by another carrier which may participate in transporting it. The law does not specifically say that attempts so to limit the carrier's liability shall not be resorted to, but it declares them to be invalid and unlawful.

The official classification roads have announced the purpose of making certain changes in their bill of lading, but as to rates are still considering the question. They say that the law will impose upon them liabilities not heretofore borne and reserve the right to assert a claim for some increase in rates on account thereof.

The southern lines at first announced their intention of making changes in their rate schedules which would exempt from any immediate increases in rates, certain important heavy commodities said to constitute about 70 per cent of their traffic, and of increasing the rates on the remainder 5 per cent. The commission notes in this connection that it has no right to assume that the proper compensation for the additional risk would be 5 per cent of the rates upon 30 per cent of the carrier's traffic, or that it would be any given per cent upon all the traffic. With regard to shipments of livestock the southern carriers have announced their intention of making an increase of 5 per cent in the rate for each increase of 100 per cent or fraction thereof in the declared value. With reference to the other rates they have later proposed to continue their

present rates in effect. Property carried, not subject to the terms and conditions of the carrier's bill of lading will be at carrier's liability, and property so carried will be subject to rates 10 per cent higher than those shown in the tariffs.

The western roads take a position substantially like that of the Official Classification roads. They admit that a 10 per cent increase can not be justified and have no desire to take advantage of a technical opportunity to mulct the shipping public.

It appears that prior to 1913 the limited liability provisions were very generally disregarded in the settlement of loss and damage claims, especially in western territory. To a very large extent at least, despite the limitations of liability, full value was quite generally recognized. After the Supreme Court decided the Croninger case, in 1913, the provisions of the contracts and rate schedules in this and other particulars were recognized as lawfully binding upon carriers and shippers alike, and the policy followed was correspondingly changed. In 1913 the policy was generally adopted, therefore, of endeavoring to enforce the limited liability provisions, but no change was made in the rates. It is now argued that inasmuch as no reduction in rates was made when the limited liability provisions were established, or when they were sustained as lawful by the Supreme Court, there is no justification for an increase in rates now that the liability conditions are restored to substantially what they were prior to 1906.

The uniform bill of lading contains a provision that claims for loss or damage must be presented to the carrier within four months, but until the Croninger case no effort was made to enforce that provision. After the decision the carriers took the position that this provision was in the bill of lading, the terms of the bill of lading were in the rate schedules, and that, therefore, it was unlawful to depart from that requirement. This created a general controversy which was considered by the commission in its report *In the Matter of Bills of Lading*, 29 I. C. C., 417.

The Cummins amendment makes it unlawful for the carrier to fix a period for giving notice of claims shorter than 90 days, for the filing of claims shorter than four months, and for the institution of suits shorter than two years. The law does not indicate the time or date from which these several periods of time shall be computed. . . . It will be necessary for the carriers to determine what periods of time they will fix for the giving notice of claims, the filing of claims, and the institution of suits. It is desirable that the rules be uniform for all the carriers of the country.

It is to be remembered that the Cummins amendment is not a separate statute, but is an amendment to the act. It must, therefore, be construed as a part of, and in connection with other portions of, the act, and in such a way as to give effect to the whole statute. . . .

The more important points which seem to be surrounded with the most doubt and upon which opinions so far expressed most sharply conflict, are:

If no changes are made in existing shipping contracts and rate schedules, will the higher rates provided therein automatically become lawfully applicable upon the date upon which the amendment takes effect? . . . It is contrary to all canons of construction to hold that an act of Congress produces a result not intended by Congress unless the express language of the act compels such a construction. There is nothing in the expressed terms of this act or in the history of this legislation that shows any intent to affect in any degree the existing rates. The legislation is aimed at specified contracts and declares them to be unlawful. The lawful rates on file at this time, therefore, are the rates providing for the limited liability. The Cummins amendment, by

making contracts limiting liability for loss caused by the carriers unlawful, does not destroy these rates, but they remain in effect and are lawfully applicable; for the 10 per cent increased rates are merely additional and can not stand in and of themselves.

Applying correct rules of interpretation, the Cummins amendment does not automatically bring into effect the increased rates named in the classifications. . . .

May the carriers lawfully provide in their tariffs and rate schedules that their liability shall be for the full value of the property at the time and place of shipment?

The loss or damage must, apparently, be either as of the time and place of shipment, time and place of loss or damage, or time and place of destination. Where rates are lawfully dependent upon declared values, the property and the rates are classified according to the character of the property, of which the value of the property may constitute an element, and such classification is necessarily as of the time and place of shipment. It is therefore believed that the liability of the carrier may be limited to the full value of the property so classified and established as of the time and place of shipment.

Does the amendment apply to export and import shipments to and from foreign countries not adjacent to the United States?

This must be answered in the negative. . . .

In the proviso, "that if the goods are hidden from view by wrapping, boxing, or other means, and the carrier is not notified as to the character of the goods," what is the proper interpretation to be placed upon the words "and the carrier is not notified as to the character of the goods"?

There is no inhibition as to the limitation of the liability of a carrier for losses not caused by it or a succeeding carrier to which the property may be delivered. The amendment has expressly reapplied the limitation of the prior act with respect to loss or damage caused by the carriers chargeable therewith. It follows, therefore, that the interpretation applied to the act before it was amended is equally applicable to the amendment in so far as the latter affects the right of a carrier to establish rates conditional upon the shipper's assumption of the entire risk of loss attributable to causes beyond the carrier's control. From this it follows that under the amendment a contract or a tariff may lawfully limit to a reasonable maximum the liability of a carrier for losses which it does not cause. It follows further that the rates provided by such tariff may be proportionate to the risk assumed.

This provision of the statute as to goods concealed from view and of the character of which the carrier is not advised clearly prescribes the right of carriers under the direction or approval of the commission to provide for a graduation of rates in accordance with the declared value of the property transported. The liability provided by the rates so established by the commission is applicable no less to instances of loss or damage chargeable to the negligence of the carrier than to those occasioned by causes beyond the carrier's control. But the carriers may not contract to limit their liability for loss, damage, or injury caused by them to property the character of which is manifested by the shipment itself or otherwise disclosed.

In this connection it has been suggested that the carrier might provide that in the event the shipper refused to declare the value the higher rates would apply. This suggestion can not be approved. If the rate is lawfully conditioned upon the value as declared by the shipper, it is as much the shipper's duty to declare the true value of the shipment, as it is his duty to declare the name of a commodity tendered for shipment as to which there are no different rates.

It is important to keep in mind that the carriers are not prohibited from making different rates dependent upon the value of different grades of a given commodity; that, except as covered by the Cummins amendment, including approval of the rates by the commission, the carrier is subject to all of the liabilities imposed by that amendment; and that if, in any instance, the shipper declares the value to be less than the true value in order to

get a lower rate than that to which he would otherwise be entitled, he violates, and is subject to the penalty prescribed in, section 10 of the act. The carrier would also be subject to the same penalty in such a case if, having knowledge that the value represented is not the true value, it nevertheless accepts the shipper's representation as to value for the purpose of applying the rate.

Do the terms of the Cummins amendment apply to the transportation of baggage?

This must apparently be answered in the affirmative. Transportation of baggage is a part of the contract for transportation of the passenger. The carriers have always limited their liability for loss of or damage to baggage. The baggage check is the carrier's receipt for the baggage. The conditions attached to the carrier's liability are stated in the fare schedules and on passage tickets of contract form. All ordinary personal or sample baggage is hidden from view by boxing, wrapping, or other means, and the amended law seems clearly to recognize the carrier's right to fix conditions and terms applicable to the transportation of baggage dependent upon the value as declared by the person offering the baggage for transportation.

The necessity for revision of the bills of lading, livestock contracts, and other similar contracts of carriage, as well as of certain parts of the carriers' classifications and rate schedules, is manifest. Bills of lading and shipping contracts can and ought to be at once amended by eliminating obviously unlawful and invalid provisions. Such action will obviate for the immediate future numerous controversies that otherwise would probably arise. Proper analysis should be made of the classifications and tariffs to bring them into harmony with the amended law.

Such changes in classifications and rate schedules can not be made upon statutory notice and become effective contemporaneously with the new law. Permission is therefore hereby given to carriers to make effective on June 2, 1915, upon not less than three days' notice, amendments to the classifications and rate schedules which eliminate provisions or rules that are in conflict with the terms of the new law, provided no such amendment has the effect of increasing any rate or charge for services.

If it shall be made to appear that, with regard to any commodity or commodities, the existing rates do not afford the carriers proper compensation, it could hardly be denied that the rates on such commodities might properly be increased in a sufficient amount to properly compensate the carriers for their added risk and liability. Where rates are lawfully based upon declared values the difference in rates should be no more than fairly and reasonably represents the added insurance. It does not appear that this amendment to the act affords justification for any increase in rates on commodities in general. As has been said, the carrier may not lawfully impose unreasonable rates upon one commodity in order to compensate it for risk or liabilities incurred in connection with the transportation of another commodity, and it is not to be forgotten that the liabilities here considered are only those for loss, damage, or injury to the property caused by a carrier or its agents or employees; in other words, the loss, damage, or injury resulting from the neglect or omissions of a carrier or its agents.

The commission has been conducting an investigation with regard to bills of lading. Further hearings in that proceeding may be necessary in the light of the Cummins amendment. In that connection matters that have been informally presented and urged in this informal proceeding may be presented in a formal way, supported by testimony, and a determination can there be reached on questions as to which the commission now has no information upon which it could base a lawful order. What is attempted here is simply to indicate the impressions gained from the experience had in the past and from the suggestions informally presented by those who are vitally interested in the effect of the Cummins amendment, and the course to be pursued for the immediate future in the light thereof. All of the questions herein discussed are, of course, subject to judicial inter-



pretation, and the views indicated herein might be somewhat changed in the light of more complete information supported by competent evidence.

The classification, tariffs, receipt and other forms used by the express companies have been prescribed by order of the commission. The new law, of course, applies to them as well as to other carriers. They have presented suggested changes in their rules and forms which will be disposed of by a supplemental order in the *Express case*.

### INSTRUCTION IN STATION SERVICE ON THE CHICAGO & ALTON

The passenger department of the Chicago & Alton Railroad has recently inaugurated a plan for instructing its station agents in the care and handling of tariffs, the manner in which passenger fares are made from the different stations, particularly in connection with the sale of interline tickets and the routing of such tickets, the care and handling and the issuance of tickets, and more uniform methods of conducting station office matters, such as keeping and filing station records, care and handling of baggage, baggage records, checks, etc., and the advertising and solicitation of passenger traffic.

In order that all agencies on the line should be thoroughly schooled and instructed in these matters the passenger traffic manager, George J. Charlton, recently arranged to send the chief clerk in his office, the chief rate clerk, the assistant to the general baggage agent, the auditor of passenger accounts and the general claim agent, together with the general agent and the division passenger agent of each division, on a trip over the line to meet the agents and give them complete and thorough instructions in all matters pertaining to their station work.

These men were provided with one of the road's official cars, and also a cafe car with a large observation room. Meetings were held in the observation room, and the safe end of the car was used to furnish meals, not only to the instruction party but to the agents in attendance at the meetings. Meetings were held at Dwight, Bloomington, Springfield and Roodhouse, Ill., and Mexico and Higginsville, Mo., and the agents from all stations within 50 miles from those cities were required to be present and in the car on the side track by 10 o'clock in the morning of the day on which the meeting was held. This plan made it possible for the agents to get to the meeting and to leave again in time to return home the same night.

It took just one week to cover the entire line of the road in a thorough manner, and the results of the first trip appeared so satisfactory to the officers that the trip will probably be made an annual affair. The party from the general offices took with them the necessary material in the way of rate sheets, time cards, folders, tickets, checks, maps and everything necessary to completely illustrate the various matters, which were discussed in informal lectures followed by a general questioning on both sides. The agents and the principal ticket sellers at each station were given a chance to meet those with whom they are in frequent correspondence on passenger matters and to gain a clear understanding as to the necessity for many little things which have been required of them and which, perhaps, have appeared unimportant in the eyes of the agents.

The agents were most enthusiastic regarding the plan. They asked numerous questions and the representatives of the general office were given an opportunity for a better appreciation of various small difficulties and inconveniences under which many of the agents were working, thus paving the way for a little more sympathy between the department and its agencies, and more good fellowship and team work all around, and it is believed that the better understanding between the department and its agencies alone will be a big benefit to all concerned. A complete record was kept of each meeting and Mr. Charlton has received a number of letters from the agents thanking him for the opportunity presented and speaking highly of the expected results from the meeting.

### PRIVATE CAR LINES NOT COMMON CARRIERS

The decision of the Supreme Court of the United States in the appeal of F. W. Ellis, general manager of the Armour Car Lines, against giving testimony concerning the doings of his company before the Interstate Commerce Commission, was reported briefly in the *Railway Age Gazette*, May 14, page 1027. The opinion is by Mr. Justice Holmes, and the decree of the district court, requiring Ellis to answer certain questions, is "reversed without prejudice." Certain questions in a long list are not disapproved.

The investigation begun by the Interstate Commerce Commission had to do with allowances paid for the use of private cars and the practices governing the handling and icing of such cars; minimum carload weights, etc. The decision is substantially as follows:

The Armour Car Lines is a New Jersey corporation that owns, manufactures and maintains refrigerator, tank and box cars, and that lets these cars to the railroads or to shippers. It also owns and operates icing stations on various lines of railway, and from these ices and re-ices the cars, when set by the railroads at the icing plant, by filling the bunkers from the top, after which the railroads remove the cars. The railroads pay a certain rate per ton, and charge the shipper according to tariffs on file with the commission. Finally it furnishes cars for the shipment of perishable fruits, etc., and keeps them iced, the railroads paying for the same. It has no control over motive power or over the movement of the cars that it furnishes as above, and in short, notwithstanding some argument to the contrary, is not a common carrier subject to the act. It is true that the definition of transportation in section one of the act includes such instrumentalities as the Armour Car Lines lets to the railroads. But the definition is a preliminary to a requirement that the carriers shall furnish them upon reasonable request, not that the owners and builders shall be regarded as carriers, contrary to the truth. The control of the commission over private cars, etc., is to be effected by its control over the railroads that are subject to the act. The railroads may be made answerable for what they hire from the Armour Car Lines, if they would not be otherwise, but that does not affect the nature of the Armour Car Lines itself. The petition of the Interstate Commerce Commission to compel an answer to its questions hardly goes on any such ground.

The ground of the petition is that it became the duty of the commission to ascertain whether Armour & Company, a corporation, was controlling Armour Car Lines and using it as a device to obtain concessions from the published rates of transportation, and whether Armour Car Lines was receiving for its refrigerating services unreasonable compensation that enured to the benefit of Armour & Company, all in violation of sections 1, 2, 3 and 15 of the act.

If the price paid to the Armour Car Lines was made the cover for a rebate to Armour & Company, or if better cars were given to Armour & Company than to others, or if, in short, the act was violated, the railroads are responsible, on proof of the fact. But the only relation that is subject to the commission is that between the railroads and the shippers. It does not matter to the responsibility of the roads whether they own or simply control the facilities, or whether they pay a greater or less price to their lessor. It was argued that the commission might look into the profits and losses of the Armour Car Lines (one of the matters inquired about), in order to avoid fixing allowances to it at a confiscatory rate. But the commission fixes nothing as to the Armour Car Lines except under section 15 in the event of which we shall speak.

The appellant's refusal to answer the series of questions put was not based upon any objection to giving much of the information sought, but on the ground that the counsel who put them avowed that they were the beginning of an attempt to go into the whole business of the Armour Car Lines—a fishing expedition into the affairs of a stranger for the chance that

something discreditable might turn up. This was beyond the powers of the commission. The Armour Car Lines not being subject to regulation by the commission its position was simply that of a witness interested in but a stranger to the inquiry, and the commission could not enlarge its powers by making the company a party to the proceedings and serving it with notice. Therefore the matter to be considered here, subject to the qualification that we are about to state, is how far an ordinary witness could be required to answer the several questions that are before the court.

It is to be observed that not every advantage that may enure to a shipper as the result of the position of his plant, his ownership or his wealth is a preference. But the intervening corporation may be a means by which an owner of property transported indirectly renders the services in question, and in that event its charges are subject to the commission by section 15. The supposed unreasonable charge may be used as a device to attain the forbidden end and therefore reasonable latitude should be allowed to see if any such device is used. But still until the Armour Car Lines is shown to be merely the tool of Armour & Company it has the general immunities that we have stated. With the foregoing general principles in view we proceed to dispose of the questions asked.

The questions concerning interlocking officers and relations between Armour Car Lines, Armour & Company and Fowler Packing Company, questions 1, 2, 3 and 7, should be answered. The only objection was on account of the general intent avowed as we have stated. So also questions 4, 5, 6, concerning the acquirement of cars previously owned by Armour & Company and Armour Packing Company, making the second group. Also questions 8, 9, 12 and 13, as to contracts of Armour Car Lines with Armour & Company and Colorado Packing Company for furnishing cars and icing service. The next group, so far as the questions concern the ownership, manufacture and repair of cars, Nos. 10, 11, 14, 16, 17 and 19, need not be answered, except 11 "where are the cars of Armour Car Lines repaired when not repaired in shops of railroads?" The last two groups concern matters into which the commission was not authorized to inquire. The fifth, questions 15, 20, 21, 25, 26, 27 and 28, called for statements showing profit and loss, credits and debits to income, etc., so far as the same related to transportation as defined in the act; and the sixth, Nos. 22, 23 and 24, for statements showing the amount invested in each icing plant and the detailed results of the operation of each, amount invested in each, cost per ton of ice at the source of supply, etc., all matters belonging to the private business of the Armour Car Lines and not open, if our interpretation of the law is correct. Our decision, however, must be without prejudice to the possibility that the case may be brought within section 15 by evidence to the effect stated above.

The decree of the District Court is reversed without prejudice.

Mr. Justice Day, while not differing from the general views taken by the court, is of the opinion that the nature of the inquiry under section 15 made it proper that all the questions should be answered.

## RAILWAY DEVELOPMENT ASSOCIATION

The annual meeting of the Railway Development Association was held on May 11, 12 and 13 at St. Paul, Minn. The program included the following papers, many of which were followed by a general discussion: "Intensive Farming in the Irrigated District," by Dr. H. H. Harrington, St. Louis, Brownsville & Mexico; "Intensive Farming in the Drainage Belt," by B. E. Rice, Norfolk Southern; "Corn Growing in the Northwest," by D. E. Willard, Northern Pacific; "Immigration," by S. A. Hughes, Frisco Lines; "Why the Department of Railroad Development Work?" by M. V. Richards, Southern; "Colonization vs. Speculation and Exploitation," by C. L. Seagraves, Atchison, Topeka & Santa Fe; "Science and the Soil," by Prof. Henry G. Bell; "Relation of Live-Stock to Agriculture," by Prof. Thomas Shaw,

Great Northern; "The Railroad Industrial Agent," by George Bonnell, Chicago & North Western; "The County Demonstration Agent as a Factor in Railway Development Work," by D. C. Welty, St. Louis, Iron Mountain & Southern; "The Value of Immigration to the Railways," by H. W. Byerly, Northern Pacific; "Erection of Buildings, Platforms, Coal Bins or Other Facilities by Railroad Companies," by John C. Emig, Cleveland, Cincinnati, Chicago & St. Louis; "Co-operating With Farmers," by G. E. Cassel, Norfolk & Western; "The Railways in the Settlement and Development of the Northwest," by E. C. Leedy, Great Northern; "A Better Agriculture," by R. F. Murray, Northern Pacific; "Northwest Immigration," by Wm. H. Killen, Minneapolis, St. Paul & Sault Ste. Marie; "Wealth in an Aggregation of Small Things," by Austin Gallagher, Western Maryland; "What Are the Prerogatives of the Industrial Agent?" by D. E. A. Schubert, Norfolk & Western; "The Field of the Agricultural Commissioner," by T. A. Haverstad, Minneapolis, St. Paul & Sault Ste. Marie; "Industrial Development," by Geo. E. Bates, Delaware & Hudson; "Conservation of Agriculture for the Northwest," by F. R. Crane, Great Northern; "Conditions Affecting Industrial Efficiency," by Grant Williams, Chicago, Milwaukee & St. Paul; "Service of the Development Man," by Rutledge Smith, Tennessee Central.

An informal banquet was held on Tuesday evening at the Hotel St. Paul. Allen D. Albert presided as toastmaster, and the speakers included Governor W. S. Hammond of Minnesota, Ex-Governor A. O. Eberhardt, and Prof. A. F. Woods, who spoke on the subject of "Agricultural Education Work." Officers for the ensuing year were elected as follows: President, John C. Emig, industrial agent, Cleveland, Cincinnati, Chicago & St. Louis; vice-president, L. J. Bricker, general immigration agent, Northern Pacific; secretary, H. O. Hartzell, assistant general industrial agent, Baltimore & Ohio Railroad; treasurer, D. E. King of the Missouri Pacific. It was decided to hold the next meeting of the association in New York in November.

## INSPECTION OF LOCOMOTIVES AND TENDERS

The Special Committee on Relations of Railway Operation to Legislation has issued Bulletin No. 66, which shows the attitude of the roads regarding the rules and regulations in connection with the new federal law affecting the government inspection of locomotives and tenders. An abstract of the bulletin follows:

Replies to Circular 69 received indicate a very clear preference on the part of the roads, as is evidenced by the replies to the following questions:

QUESTION	ANSWER Roads replying	
	Yes	No
1. Should the rules and regulations for the inspection of locomotive and tender be filed by the roads individually? .....	9	135
2. Should they be filed, if possible, by agreement between the roads? .....	103	37
3. Should a conference be sought with the Government representatives for the purpose of formulating a standard code? .....	131	22
6. Should the rules and regulations be confined, so far as possible, to inspection solely? .....	148	1

Roads operating 171,705 miles have authorized this committee to represent them in these negotiations. Roads operating 22,966 miles, while not specifically delegating this committee to represent them, have promised co-operation and have named representatives. Replies have not been received from roads operating 26,297 miles.

The committee will, therefore, undertake these negotiations with the government on the understanding that should any radical differences of opinion develop as between the roads which it is authorized to represent and those which will deal with the subject individually, it will report the fact with a suggestion for further procedure.

The negotiations will be undertaken by the Conference Com-



mittee of Mechanical Officers, which consists of the following gentlemen:

C. E. Fuller.....S. M. P. & M.....Union Pacific (Chairman).  
A. W. Gibbs.....Ch. Mech. Engr.....Pennsylvania.  
F. H. Clark.....G. S. M. P.....Baltimore & Ohio.  
D. R. MacBain.....S. M. P.....New York Central.  
R. E. Smith.....G. S. M. P.....Atlantic Coast Line.

The following gentlemen will be asked to act with this Committee of Conference in order to provide for the widest representation:

H. T. Bentley.....S. M. P. & M.....C. & N. W.  
F. F. Gaines.....S. M. P.....Central of Georgia.  
John Purcell.....Asst. to V. P.....A. T. & S. F.  
W. H. V. Rosing.....Spec. Engr.....St. L. & S. F.  
C. B. Young.....Mech. Engr.....C. B. & Q.

It is understood that the chief inspector of locomotive boilers desires co-operation in the formulation of the rules and instructions necessary under the act. In view of this fact it is strongly recommended that the railroads do *not* file with the chief inspector any rules or instructions of their own until further advised by circular.

## STATISTICS OF EXPRESS COMPANIES FOR 1914

The Interstate Commerce Commission has issued a report on the statistics of express companies in the United States compiled from returns made by the companies for the year ended June 30, 1914. This is the sixth report in the series and covers statistics of the 11 important companies. The total mileage covered in the operations of the express companies as of June 30, 1914, was 305,690, as compared with 301,621 for 1913. This includes coastwise, river and lake mileage, but does not include ocean mileage or any mileage in foreign countries except Canada and Mexico. The steam road mileage was 256,183; electric line mileage 7,680; steamboat line mileage 40,929 and the stage line mileage 896. The total express mileage increased 4,069 miles in 1914, as compared with 1913. The mileage on steam roads increased 4,357 miles. The greatest total mileage shown is that for Wells, Fargo & Company, 99,017, of which 63,692 was steam road mileage. Of the companies listed, eight show increases during the year in mileage covered, two showed decreases and one, the Globe Express Company, shows the same number of miles for 1914 as for 1913. In the steam road mileage the largest increase was that of the Canadian Express Company, 2,551 miles, practically all of which represents the extension of service over the line of the Grand Trunk Pacific.

Tables are given in the report showing mileage by states and territories for 1914 and 1913, cost of real property and equipment, inventory value of equipment owned, income account and profit and loss account, analysis of operating revenues, analysis of operating expenses, general balance sheet statement and statement of financial paper issued during the years 1914 and 1913.

The total cost of real property and equipment for 1914 is given as \$33,994,114, of which \$16,446,268 represents real estate, buildings and fixtures, of which \$6,708,172 represents vehicles, \$3,849,554 horses, and \$4,470,759, office equipment. The cost of cars is stated at \$603,786. The total inventory value of equipment is given as \$12,652,618, whereas in 1913 it was \$13,555,714.

The income account and profit and loss account for the two years, showing a decrease of nearly \$10,000,000 in gross receipts and of over \$4,000,000 in net operating revenue, is as follows:

INCOME AND PROFIT AND LOSS ACCOUNT			
Income Account			
	1914	1913	
Operating income:			
Gross receipts from operation.....	\$158,891,326.67	\$168,880,923.13	
Express privileges—Dr. ....	79,906,078.38	83,872,497.17	
Operating revenues .....	\$78,985,248.29	\$85,008,425.96	
Operating expenses .....	77,221,993.81	79,215,707.71	
Net operating revenue.....	\$1,763,254.48	\$5,792,718.25	
Outside operations:			
Revenues .....	\$428,155.25	\$310,201.37	
Expenses .....	462,041.80	370,133.67	
Net revenue from outside operations...	\$33,886.55	\$59,932.30	
Total net revenue .....	\$1,729,367.93	\$5,732,785.95	

Taxes accrued .....	1,491,698.62	1,379,258.40
Operating income .....	\$237,669.31	\$4,353,527.55
Other income .....	4,531,740.46	5,563,792.18
Gross income .....	\$4,769,409.77	\$9,917,319.73
Deductions from gross income:		
Separately operated properties—Loss.....	\$66,674.39	\$14,009.79
Interest accrued on funded debt.....	784,371.97	801,578.75
Other interest .....	237,235.21	157,644.92
Other deductions .....	181,406.95	333,196.87
Total deductions .....	\$1,269,688.52	\$1,306,436.33
Net corporate income.....	\$3,499,721.25	\$8,610,889.40
Disposition of net corporate income:		
Dividends from current income.....	2,986,250.24	4,679,823.44
Appropriations for other reserves.....		6,594.72
Balance to profit and loss.....	\$513,471.01	\$3,924,471.24
Profit and Loss Account		
Credit balance on June 30, previous year...	\$60,165,377.81	\$61,955,552.88
Credit balance brought forward from income account .....	513,471.01	3,924,471.24
Additions for year.....	985,279.17	161,910.04
Deductions for year.....	31,453,815.91	2,704,500.29
Dividends declared out of surplus.....	2,577,683.46	3,172,056.06
Balance, credit, carried to balance sheet	\$27,632,628.62	\$60,165,377.81

It is stated in a footnote that the decrease of \$32,532,749 in the credit balance carried from profit and loss account to the balance sheet, aside from the effect of the decrease of over \$4,000,000 in net operating revenue, is substantially represented in special charges to the profit and loss account of the Adams and American companies. The Adams company during the year fixed its capital stock at the sum of \$12,000,000, and the specific liability for capital stock was included for the first time in 1914 balance sheets of the company. The charges made by the American Express Company are adjustment of book value of securities owned by company, \$3,077,930 and distribution to share holders of Wells, Fargo & Company stock held by company of \$9,000,000.

## TRAIN ACCIDENTS IN APRIL

The list of notable train accidents occurring in the United States in the month of April (made up by us, as usual, from reports found in the daily papers) is so short that a tabular statement is not necessary. One collision and one derailment, as noted below, are all that we have found which may properly be classed as "notable," and, so far as casualties are concerned, even these are relatively unimportant.

On the Atlantic Coast Line near Tarboro, North Carolina, on the twenty-fourth, northbound passenger No. 42 collided with a southbound freight. Both engines were slightly damaged and three passengers and the Pullman conductor were slightly injured. The freight had encroached on the road-right of the passenger train without proper flag protection.

On the Missouri, Kansas & Texas near Higbee, Mo., on the 29th a northbound passenger train was derailed and three cars were damaged. Three passengers were injured, but not seriously. The train was moving at about 35 miles an hour, and the derailment is believed to have been due to a soft spot in the track, on the inside of a curve, due to heavy rain.

*Electric car accident.*—At Detroit, Mich., on the 14th a street car was run into by a switching freight, at a crossing, and 15 persons were killed and 20 injured. This accident was reported in the *Railway Age Gazette* of April 16.

**BUSINESS AT VLADIVOSTOK.**—There has been a great increase recently in imports to Vladivostok for transmission to Siberia and Russia over the Trans-Siberian, says an Ashai despatch, especially in those from America. Four or five steamers of 4,000 to 5,000 tons are constantly in harbor awaiting their turn to discharge cargo. The cargo congesting the landing place is rapidly increasing, and the warehouses recently built to store wheat for export have been leased by the custom house. The Chinese Eastern has been doing all in its power to provide freight cars, but is unable to meet the increasing requirements. American cotton forms the bulk of the goods imported. Already 100,000 bales have arrived and 300,000 are on their way to Vladivostok.

# International Railway Fuel Association Convention

## Powdered Coal for Locomotives; Fuel Stations and Coal Storage Methods; and Smoke Prevention in Chicago

The seventh annual convention of the International Railway Fuel Association was held in the La Salle Hotel, Chicago, May 17 to 20, D. R. MacBain, superintendent motive power and rolling stock, presiding. The convention was opened with prayer by Rev. John W. Nicely.

### PRESIDENT'S ADDRESS

Mr. MacBain said in part: "I am a great believer in the educational phase of the question of fuel. To render efficient service economically in any particular line, familiarity with its details is essential, and this is the more particularly true, perhaps, in the case of the man who actually handles the coal between the locomotive tender and the firebox. For fuel might be purchased with the utmost skill, receive the best attention as to grade and preparation by the railroad company's inspectors, be carefully passed from the coaling plant to the tender and then might be subjected to the grossest kind of misuse and extravagance. The firemen need practical instruction on the road, the more they get the better, and the more efficient and economical will be their services. With this practice in vogue, I am positive that the salaries of the instructors will appear as assets, doubled and trebled, on the auditors' books."

### ADDRESS BY MR. SCHOYER

A. M. Schoyer, resident vice-president, Pennsylvania Lines West, made a most interesting address after commenting on the very creditable work of the fuel association. In his address, he said in part:

"It seems to me that one of the burning questions of the day, from a railroad standpoint, is what shall the railroads do either to offset the continuing demand for increased wages or to get the relation of employer and employee on a sounder basis, where right will be considered, instead of might or expediency.

"Three remedies have been suggested—first, government ownership of railroads. I hope that should this country ever adopt government ownership, that I may be out of the railroad business before it is done. The party and administration which are in power when the railroads are once taken over by the government will probably remain in power thereafter as long as they want to. With over two million men working for the railroads and with ten million women and children dependent upon them, any administration having the appointive power can have a force of practically five million railroad votes in hand at all times. Woe to the time and country when any one party or man can have such unlimited power. With ward politicians acting as general managers, state politicians handling the policy, national politicians handling the finances and labor leaders handling the labor questions, there would be no need of arbitration for the wages would be increased upon the asking. There would be no strikes for there would be nothing to strike about. It has always seemed to me that the reduction of interest argument is not at all sound. The government's ability to borrow at a cheap rate of interest is due to the confidence which people have in its ability to pay. With the railroads in the hands of the government, with rates probably continually being decreased, in order to favor special lines of voters, and with wages being increased to favor special lines of labor unions, with incompetent supervision of details the growing deficits would have to be raised by taxation, and it is quite certain to my mind that the result of such losing operations would be that the credit of the government would suffer and rates of interest go higher and higher. I shall, therefore, lay aside the thought of government ownership settling the relations of the men and the railroads.

"The second solution, which has been suggested, is that if the law should provide and the Interstate Commerce Commission

should authorize that whenever railroads must through arbitration increase the wages of the employees in any branch of service they be also authorized to increase their freight rates automatically. If an arbitration should give the men an increase of wages of 6 per cent, then the railroads should be authorized to increase freight rates, say 3 per cent. How long the farmer would stand this I do not know; probably once. How long the public generally would stand it I do not know. They might stand it twice. But such a law would soon become so unpopular and would be so burdensome that we might readily expect it to be changed by unanimous consent in a very short time. Therefore, I do not believe that this would solve the question, except for a very short period of time.

"With very great diffidence I bring forward a third solution, compulsory arbitration. Not arbitration as under the Canadian law, which is not entirely compulsory; not arbitration as under the American law, which is entirely optional; not arbitration as exists in any country today; but a law which would compel employer and employee to submit their differences to a court of arbitration, after having done all they could together to solve them.

"I think the court should be constituted by the appointment of three, five or the required number of judges by the President, with the required approval of the United States Senate and of the chief justice of the Supreme Court; the judges to hold office for 10 years, to receive a large and adequate salary, to be removable only for malfeasance in office, and with the approval of the President, the Senate and the chief justice of the Supreme Court. The law should provide that the man should be of adequate ability in the minds of those who appoint him; that he should not have been a railroad officer nor a member of a labor union for five years prior to his appointment. The law should require that no lockout or strike should occur hereafter on railroads, but that when the employers and employees have exhausted their means of getting together they should unitedly refer the matter to the court of arbitration. The decision of the court should be binding; not to be appealed from, except as to errors of law appearing on the record.

"No doubt such a court would be crude at the start. The judges would not know the railroad business nor would they be acquainted with labor difficulties, but, being absolutely free from all politics, political influences, or financial embarrassment, they would, as all men do under similar circumstances, become more and more fair and enlightened and conservative as the time went by.

"Such a law, would, of course, meet with tremendous storms of protest from the employees. It would take from them their liberty to strike, but the law should provide that no requirement of the law should interfere with rights of the men as individuals to leave the employment of the railroads at their own volition. It would meet with indignant protest from the railroad companies, who would feel that it took away from them the right to settle their own questions, both of a financial and disciplinary nature, but the law should provide that nothing in the law should prevent the railroad companies from discharging individual men for cause.

"If these objections could be overcome, and if the law could be passed, it seems to me that its effect would be to stop the unreasonable demands from going to the limit of persecution. Neither the employers nor the employees would be willing to go to the limit of submitting matters to this court unless they were assured of the justice of their positions, and, in the course of time, labor and capital, as applied to the railroads, would find their own relations."



## POWDERED COAL\*

By W. L. ROBINSON

Supervisor of Fuel Consumption, Baltimore &amp; Ohio

Coal in a finely divided or powdered state represents the most advanced method for producing perfect combustion, thereby making it possible to more nearly obtain the full heat value of the fuel than by any other known means. While a cubic inch of solid coal exposes only 6 sq. in. for absorption and liberation of heat, a cubic inch of powdered coal exposes from 20 to 25 sq. ft., which enables the more uniform gas production from the volatile matter in the coal and the more prompt and perfect intermingling of gas and air, thereby improving combustion and reducing smoke. Furthermore, there is no cooling of the fire by heavy intermittent charges of fresh coal, and consequent production of lost heat, as is the case with hand or stoker firing on grates.

The mechanical production of coal by machine undercutting and shearing and by powder mining has materially affected the grade of coal produced, by increasing the percentage of dust and slack, which in some instances is as high as from 45 to 55 per cent of the total mine output. The generally recognized waste, unsalable or otherwise low-value coal mine products, such as culm, slack, mine sweepings and dust, all of which are suitable for converting into the powdered form, represent practically the same acreage and mining cost per ton as the commercial grades. Moreover, by powder mining and mechanically exhausting coal in a fine state suitable for powdering, out of shallow, faulty, inferior quality and otherwise undesirable abandoned operations, much fuel that is now going to waste could be advantageously mined and utilized. Furthermore the annually increasing expense to produce the inferior qualities and grades of coal in the mining operations, now make it essential that the railways utilize as much as possible of the inferior grades and qualities of local fuel supply available, in order to conserve the better mine output for commercial revenue tonnage in the domestic and foreign trade.

In general, powdered coal, to give the best results as regards complete combustion and the least trouble as regards ash and slag, should contain not more than 1 per cent moisture, and be of a uniform fineness, so that not less than 95 per cent will pass through a 100-mesh, and not less than 85 per cent through a 200-mesh, and not less than 70 per cent through a 300-mesh screen. The cost for preparing powdered coal will vary with the cost for the raw coal and its moisture content. However, a general average from available data covering periods of the past five to ten years at cement and metallurgical plants will enable the following conservative estimate, assuming the cost of the raw coal at from \$1 to \$2 per short ton, and that it will require crushing and have a moisture content of from 5 to 10 per cent, when placed in the dryer.

Capacity of plant in short tons per hour	Average total cost for preparation per short ton
2.....	From 25 to 50 cents
3.....	From 20 to 45 cents
4.....	From 16 to 40 cents
5.....	From 14 to 35 cents
10.....	From 12 to 30 cents
25.....	From 10 to 20 cents

The fuel required for drying the coal will average from 1 to 2 per cent of the coal dried. The distribution of the total cost may be approximately stated as:

Fuel for drying.....	10 per cent
Power for operation.....	30 per cent
Labor.....	30 per cent
Maintenance and supplies.....	25 per cent
Interest, taxes, insurance and depreciation.....	5 per cent
Total .....	100 per cent

The cost for preparing powdered coal should be more than offset by the ability to utilize the cheaper grades of fuel.

Finely divided coal dust gives off gas at normal atmospheric temperature, but any pulverized coal coarser than that which will pass through a number 100-mesh screen is liable to explosion only when distilled by the heat or compression of a pri-

mary ignition. The finer than what will pass through a number 100-mesh screen carries no danger unless combined in a dry state, in floating suspension in nearly still air and mixed with the requisite amount of oxygen at the requisite temperature to produce "chemical tension" or primary ignition.

Powdered coal may be burned by either of two generally defined methods: The first, or long-flame method, constitutes a progressive burning of the coal. This combustion is accomplished by projecting the primary air which carries the fuel into the furnace with high velocity, the additional air (about 75 per cent) required for combustion being blown or induced into the furnace from other sources. The second, or short-flame method, has been the latest development. This process involves a flame of relatively short travel, and consists of admitting the entire air supply needed for combustion into the furnace with the fuel at low velocity. In the application of powdered coal to a New York Central locomotive, a combination of the long and short-flame methods has been used.

But very little descriptive data as regards the equipment that is essential for burning powdered coal in locomotives has been obtained. However, it may be stated that the principal requirements are: An enclosed fuel container; means for conveying the fuel to the feeders; means for commingling the fuel with air at the time of and after feeding; supplying the proper amount of air to produce a combustible mixture at the time the fuel and air finally enter the furnace; a suitable refractory-material furnace in the firebox; means for disposing of the slag; means for producing the proper draft through the furnace and the boiler; means for harmonizing the draft and the combustion; suitable power for operating the fuel and air feeding mechanism, and an automatic and hand control of the fuel and air regulation.

It is understood that the developed equipment for burning pulverized fuel can be readily applied to all existing modern types of steam locomotives without any changes in the boiler except to install arch brick supporting tubes, where fireboxes are not now equipped, and to remove the grates, ashpan and smokebox draft appliances. There is no equipment in the cab except the automatic hand control, which is placed in a position convenient to the fireman. The enclosed fuel container is suitable for either powdered coal or fuel oil, and either kind of fuel can be used by merely changing the feeding equipment. The total weight of the equipment applied will about equal that of the equipment removed.

The information pertaining to the operation of powdered coal burning equipment is also vague. It is understood, however, that for firing up a locomotive, the necessary draft through the boiler is obtained by means of the usual stack steam blower, after which a piece of lighted waste is placed in the fuel and air conduit leading to the firebox, and one of the fuel feeders is started.

## SOME BENEFITS TO BE DERIVED FROM ITS USE

With powdered coal the tendency toward the more uniform, intense and sustained firebox temperature, as well as the automatic, continuous stoking of the fuel and the burning in suspension; feeding of practically dry fuel to the furnace; reduction in the clogging and leakage of flues and the reduction in the various heat losses, should all tend to maintain the boiler capacity at its maximum effectiveness under varying operating conditions.

Through the burning of powdered coal in suspension, the necessity for over or under-feeding fuel to grates or retorts is eliminated, and as there are no grate fires to require cleaning, it enables the establishing of the most economical length of locomotive run for the train service to be performed, and the reduction of engine house terminals. As locomotives burning oil are being regularly and successfully operated on runs from 300 to 450 miles each way, the same should be entirely feasible when burning powdered coal.

The use of bituminous coal in a powdered form seems to be the logical solution of the smoke, cinder and spark questions

\*See also article on "The Use of Pulverized Fuel for Locomotives," published in the *Railway Age Gazette* of April 30, page 941.—[EDITOR.]

at engine houses, terminals and on the road, and one that should greatly reduce the loss of heat and fuel cost resulting from imperfect combustion in existing and future steam locomotives.

The elimination of ash pans, grates, smokebox, diaphragm, baffles and nettings substantially reduces the retardation of the products of combustion through the boiler.

With powdered coal, the fuel is supplied to an enclosed, air-tight container on the tender (suitable for either powdered or liquid fuel), prepared to uniform fineness and thoroughly dried, so that when fed to the furnace it immediately produces effective heat. Furthermore, the coal is not touched by hand or shovel from mine car to furnace and there is no loss by pilfering, dropping from the tender container, gangways, through holes in deck, or by firemen shoveling undesirable fuel off the tender on right-of-way.

When powdered fuel is used, the refractory-material furnace retains its heat and prevents the chilling of the firebox and flues, even though the supply of fuel may be cut off and therefore reduces the liability of firebox leakage.

When being worked at from one-half to maximum boiler horse power capacity, a locomotive boiler equipped with a superheater will range from 65 to 55 per cent boiler efficiency, this being representative of the best grate fire practice. Taking into consideration the effect of burning powdered coal in suspension on the various heat losses enumerated, it is most conservative to place the saving to be effected at 25 per cent of the coal fired, actual performance to date having shown as high as from 30 to 40 per cent saving.

The time required for building, cleaning or dumping fires at terminals and cleaning flues and smokeboxes on steam locomotives represents a large percentage of the maximum non-productive delay to power, and is directly responsible for much road and yard crew and shop labor expense. With powdered coal there are no grate fires to clean; the extremely fine nature of the ash and absence of cinders causes practically no accumulation in the flues or smokebox.

As the sulphurous and other poisonous gases resulting from combustion tend to precipitate with the liquid ash into slag, the poisonous and suffocating effect of the products of combustion emitted from the stack is materially reduced.

The use of powdered coal (due to absence of cinders, sparks, ashes, etc.), would reduce cementing of ballast and lack of drainage of roadway, burned out ties and the cost for forking ballast.

As the larger locomotives now frequently require the feeding of from 4,000 to 10,000 lb. of coal per hour to produce their rated hauling capacity, the effectiveness of the boiler is dependent largely on the intelligence and physical qualifications of the fireman. However, with powdered coal and automatic mechanical mixing of the fuel and air and its combustion in suspension, no manual labor is required, and the human element is practically eliminated.

*Discussion.*—The members participated freely in the discussion, there being some skepticism as to the ultimate outcome of the use of powdered coal. E. H. Stroud, of E. H. Stroud & Company, stated that the coal must be powdered to the correct fineness and that it must be uniformly fine if the best results are to be obtained.

Complete combustion must be obtained to prevent the formation of cinder slag and if the furnace is correctly designed there should be no trouble with the accumulation of slag on the flues. The air and the fuel passed through the burner should be definitely measured, and to accomplish this he strongly recommended that the air necessary for the complete combustion of the powdered fuel be admitted only through the burner. Where air is used to separate the fine from the coarse particles in the process of pulverizing—a coal with 10 per cent. moisture will be reduced to 7 or 8 per cent. moisture. He also recommended a lazy flame, stating that in stationary plants this would give a temperature that could be regulated from 1,800 to 3,600 degs. F.

In this same service savings as high as 50 per cent. in fuel of a low price have been made. He gave estimates of 15 cents per ton as the cost for pulverizing fuel at the rate of 5 tons per hour and 4 to 5 cents per ton for drying the coal. From his experience he found that a draft of only  $\frac{3}{8}$  in. (water column) was required. He recommended a coal with not less than 25 per cent. volatile.

Joseph Harrington, of the Powdered Coal Engineering & Equipment Company, called attention to the effect the use of powdered coal on locomotives would have in postponing the necessity of electrification at large terminals such as Chicago, and spoke to some extent on the large field this type of fuel offers to the railroads.

J. E. Muhlfeld, president of the Locomotive Pulverized Fuel Company, presented a written discussion, in which he confirmed the conclusions derived from Mr. Robinson's paper. He showed that if the powdered coal equipment was applied to all types of locomotives an annual saving of millions of dollars could be made in the cost of fuel to the railroads.

Other speakers who have had experience in the use of powdered coal spoke strongly in its favor, and all called attention to the necessity of having the powdered fuel dry, the maximum moisture being placed at 2 per cent.

Mr. Robinson stated in his closure that tests have shown that only 15 lb. of dust was found in the locomotive front end after a test of two weeks and that evaporation of  $8\frac{1}{2}$  to 12 lb., from and at 212 deg., had been obtained.

#### FUEL CONDITIONS IN SOUTH AMERICA

By JAMES W. HARDY

Sales Agent, West Kentucky Coal Company, New Orleans, La.

Chile, under normal conditions, uses about 3,000,000 metric tons of coal annually; about one-half of this amount comes from foreign countries and the other half is produced at home. In addition during the year 1913 they used 230,845 tons of oil. The physical characteristics of the coal are about the same as Illinois or Oklahoma coal, but considerably lighter, and they use more of it to do the same work than they do of either Welsh or Australian coal. Local coal is sold for considerably less than foreign coal on account of its lightness and preparation. The prices paid for railway coal by the Chilean government for the past eleven years range from \$4.44 to \$7.28 (in our gold) per short ton, and the average was \$5.62 per short ton for all coal. Their specifications were drawn up in such a way that they practically exclude North American coal. They place a limit of \$2.11 (Chilean) per 1,000,000 calories (based on kilograms of fuel). This would mean a price of \$4.86 per short ton for coal running 12,800 B. t. u. per pound. In addition to this 5 per cent moisture, 15 per cent ash and 2 per cent sulphur was the maximum and a further limitation of 15 per cent screenings through a  $\frac{1}{2}$ -in. bar screen, set at an angle of 45 deg.

They have used briquettes to some extent in Chile until the European war started, and prefer them to coal and pay about 10 per cent more for them. They prefer to handle them, and so do the ship people prefer them as freight, as they can be loaded and unloaded more rapidly and with less waste.

Peru is not developing her fuel supply to the same extent or as rapidly as Chile and uses much less coal than Chile. The coal mined in Peru is of such inferior grade that its use was discontinued on locomotives; it clinkered badly and ran over 20 per cent ash, fusing at a very low temperature. The Peruvian steamship line uses oil altogether.

Freight rates to South American ports are cheaper from Australia than they are from the United States. Coal is placed on ships at \$2.50 per metric ton and taken across in sailing vessels at from \$4.30 to \$5 per ton freight charges, English coals at \$1 to \$1.50 higher. The freight cost to get North American coal down there is considerably more than this. The toll through the Panama canal is \$1.20 per 100 cu. ft. of carrying capacity, so it costs about 60 cents per ton to get coal through the canal. The best ocean freight rate to the west coast would be between



and \$6 per ton. The rates have a wide range of fluctuation; they go largely on the theory of "charge all the traffic will stand" and this very feature is a grave danger in getting tied up in contracts for fuel deliveries to those countries.

I only wish the people in the United States, who are clamoring so vigorously, loudly and persistently for government ownership, could see and ride on the government railways of Chile. I am sure they would then be glad and contented to allow things on the railways of the United States to be handled and operated as at present and with, at least, their moral support. The railway between Valparaiso and Santiago is a 66-in. gage track, poorly kept up, coaches dirty and badly in need of paint and varnish, freight cars in a dilapidated condition, coupled with hooks and chains the same as the safety chains between our engines and tenders. No air brakes or safety appliances, not even grab irons. The engines are all much cleaner than they are in the United States. Engineers (drivers as they call them) receive \$2.25 to \$2.50, and firemen \$1.40 to \$1.90 per day on a basis of our money. The position of engineer or fireman is not thought much of and their responsibilities are not recognized as they are with us; their social position does not compare with ours in any way.

Their standard shovels were quite a curiosity. The blade is 18 in. long, 6 in. wide, 2 in. deep and has a handle 53 in. long with a little knob on the end. These shovels hold 7 to 9 lb. and are very inconvenient to handle. The fire doors are very small and are left open nearly all of the time. There is a deflector just above the door on the inside set at an angle of about 30 deg., which throws the currents of cold air down on top of the fire, so there is apparently no bad effect on the flues from leaving the door open. They never shake the grates because they are all stationary. They put the coal in about as it burns, and it is astonishing to see how little is in their fireboxes at the end of the run. The freight cars are 10 to 15 tons capacity, although there are some of 30 tons capacity; the smaller size being the favorite. The road is lined with scrap; thousands of dollars' worth being eaten up by the rust. They charge you as much for the baggage as they do for the passenger in some places. The passengers are divided into two classes and they pay according to class; their comforts are about in proportion to the classification.

The Peruvian Corporation Company of London, England, controls nearly all the railways of Peru; they are government owned and were operated by the government for years, but the operation was so faulty and expensive that it nearly bankrupted the country. The service was so poor and uncertain that they were finally taken over by the above corporation to operate for a period of eighty years, and under the able management of such men as J. H. Feehan, who is a native of the United States, they are being placed on a safe basis and are beginning to pay and improve.

The Oraya Railway or Peruvian Central runs out of Lima and crosses the Andes mountains at an elevation of 15,665 ft. above sea level. This is one of the most wonderful pieces of railway engineering and the highest railway in the world. In going 106 miles the main line rises steadily from sea level with an average grade of about 4 per cent, clinging to or boring through solid rock almost the entire distance, to its highest point at Ticlio. There are 65 tunnels, 67 bridges, many of them perfect marvels of construction. Sixteen switch backs are located at various points where the steepness of the mountain permits of no other means of ascent. They have 65 locomotives, both English and American oil burners.

We in the United States have no idea how the cataclysm in Europe has affected South American countries. Train service is reduced in many places to a passenger train per week; shops are working two days per week with reduced forces; thousands of people are out of employment and in destitution.

There have been numerous articles in the newspapers about the great possibilities of our walking away with all of the South American trade. We need educating in these matters more than

do the people in South America. To do business extensively with South America we must establish banking facilities with them. We must extend long credits, six months to a year at least; we must teach them the American dollar instead of the English pound. We must find a home for their exports; their regular markets are now closed and, as their revenue is largely from exports, how can they buy or pay, unless they can borrow or sell? Representatives must go down there and live; learn the language, customs and habits of the people, their needs and requirements and cater to them. Make things the way they want them instead of trying to convert them to our standards, and then sell at reasonable profits. Of the total tonnage imported by Argentina, Brazil, Chile and Uruguay, only 5.17 per cent comes from the United States.

## ANALYSIS OF DEPENDENT SEQUENCE AS A GUIDE TO FUEL ECONOMIES

BY HARRINGTON EMERSON

The Emerson Company, Efficiency Engineers, New York

With a good steam engine, a good furnace and a good boiler, a horsepower can be produced from one pound to a pound and a half of coal. The steamers of the Inch Line have long records of one pound per 1 hp. The Lusitania, with all her auxiliaries, uses about 1.5 lb. The indicated horsepower generated by all the locomotives of the country when pulling trains, divided into the total fuel, amounts to between 4 and 6 lb. I intend to speak of those attainable ameliorations in our locomotive practice as might reduce the 6 to 4, the 4 possibly to 3.

To bring about attainable reductions, there are three essentials: Complete knowledge of what is taking place from mine to ash pit; an organization that is capable of taking hold of the subject; an organization that is competent to solve the problems.

The first step towards the solution of the problem is to set down what we do know of all the steps from mine to ash pit. It will be found that there are some sixty different, distinct steps and that they form what is technically called a dependent sequence. Unlike the links of a chain, which are in dependent sequence, the use of coal is one in which any loss that occurs in the first term is carried on into the second, the losses in the second link or term are carried on into the third link, and we find suddenly that we have frittered away all the strength there was.

### DEPENDENT SEQUENCES IN COAL USE IN LOCOMOTIVE OPERATION

Sequences				
1 to 23	23	A	Administrative inefficiencies	51 per cent
24 to 32	9	B	Shrinks in quantity between purchase and use	92 per cent
33 to 45	13	C	Wastes due to poor design	69 per cent
46 to 52	7	D	Wastes due to poor firing	71 per cent
53 to 58	6	E	Wastes due to poor running	88 per cent
	58			20 per cent

Probably in no case do all the possible losses occur cumulating on any single road, but probably on every road there are at least 30 different kinds of losses. As to each of the fifty-eight a separate analysis would be desirable, an analysis that each must make for himself. I shall content myself with a few indications and a very elementary estimate of the loss that may be occurring.

*A.—Administrative Losses.*—These far exceed all others, but it is the fireman and engineer who get the most blame.

1—Eff. 99.5 per cent. Buying too much coal. Coal costs money and money carries interest. For a road spending \$6,000,000 for coal at \$1 a ton the difference between a two months' supply and a two weeks' supply amounts annually to \$45,000 a year, or the loss from this source might amount to 0.5 per cent.

2—Eff. 96 per cent. Paying too much. This is much more serious. Coal contains B. t. u's, and this is all that makes it valuable. Wise buying might secure 5 per cent more B. t. u's for the same money. This has proved feasible in industrial plants and on railroads as to other items than coal.

3—Eff. 95 per cent. Buying wrong kind of coal (clinkering, coking, etc.). Certain coals containing 60 per cent of B. t. u's of another coal or—The type of coal may make a very great difference. Wisdom as to this matter might make a difference of 5 per cent.

4—Eff. 94 per cent. Unnecessary transportation. Probably \$0.60 a ton

is added to cost of coal on long roads by transportation charges, of which \$0.06 might be saved by wise routing.

5—Eff. 98 per cent. Unnecessary handling expenses, loading and unloading, detention of cars, etc.

6—Eff. 90 per cent. Wrong sizing of coal. A. G. Kinyon, a recognized authority, estimates the difference between properly sized coal and usual run at 10 per cent.

7—Eff. 98 per cent. Loss in value of coal due to weathering. In some coals this is very great, as much as 10 per cent in a year. It might be conservatively estimated at 2 per cent.

8—Eff. 99.7 per cent. Moisture in coal. Even if the coal absorbs 5 per cent of moisture the loss is small, about one-third of one per cent.

9—Eff. 99 per cent. Bad water conditions, indirectly affecting coal consumption. Our experience has been that when water was very bad, coal consumption for similar trains and locomotives is higher.

10—Eff. 95 per cent. Scale on tubes and other fire surfaces. F. W. Foltz, fuel supervisor of the Missouri Pacific, stated that the fuel losses due to this cause were enormous. They undoubtedly might be far worse than the 5 per cent allowed.

11—Eff. 99.7 per cent. Leaks from boiler.

12—Eff. 99 per cent. Broken grates. Causing excess of air and waste of coal before being burned.

13—Eff. 97 per cent. Use of cold water and frequent changes. On a road using 6,000,000 tons, this loss probably amounts to \$200,000 a year.

14-15-16-17—Eff. 85 per cent. Terminal and roundhouse losses. Mr. Foltz's estimate of terminal and roundhouse losses is 15 to 30 per cent of total fuel bill.

18—Eff. 98 per cent. Detentions on side tracks.

19—Eff. 99 per cent. Short sidings and other unnecessary see-sawing of trains.

20—Eff. 99 per cent. Uneconomical grades. It is very easy to lose money on a grade in order to try to save it on coal. There are, however, sags and fills that have altered original grade that if corrected would favorably affect all operation, including coal.

21—Eff. 98 per cent. Uneconomical loading.

22—Eff. 98 per cent. Wrong assignment of power.

23—Eff. 98 per cent. Unscientific time schedules. Based on distance rather than grades.

If all these inefficiencies should occur on the same road, only one as high as 10 per cent, many of them less than 1 per cent, the end result would be under 51 per cent.

**B.—Shrinks in Quantity Between Purchase and Use.**—The locomotive is generally charged with coal purchased, not with coal used. These losses are partly due to dishonesty and partly due to carelessness.

24—Eff. 99 per cent. Incorrect mine weights (dishonesty).

25—Eff. 99.5 per cent. Incorrect car weights (carelessness). A car, owing to mud, etc., is more apt to be more than stenciled weight. The extra weight is paid for as coal.

26—Eff. 98 per cent. Biased weigher.

27-28-29-30—Eff. 97.5 per cent. Loss in transit (coal that drops off or is thrown off, loss in loading tenders, loss from tenders). These losses, although small, are like a continuous leak. One railroad supervisor told me that the loss on commercial coal in transit was 2.5 per cent. It is not less for company coal.

31—Eff. 99 per cent. Diversion from coal in transit. I knew a flouring mill which operated for a year on stolen coal, whole car loads being diverted, after being weighed and charged to coal bunkers.

32—Eff. 99 per cent. There are other diversions, as when coal from bunkers is used for office and roundhouse fires, etc., coal used perhaps for company but not used on locomotives. These dishonesties and semi-dishonesties amount perhaps to as much as 2 per cent. The end result is about 92 per cent.

**C.—Waste Due to Poor Design.**—The best stationary steam engines use about one pound of coal per 1 hp. The ordinary commercial steam engines use from 3 lb. to 20 lb. The conditions under which a locomotive operates are extraordinarily difficult. The power installation is mounted on wheels, the machinery must be rugged rather than accurately finished. Every element of standard operation varies from minute to minute. The fuel, the water, the load varies. It is, therefore, inevitable that severe losses occur from poor design. In good stationary practice 80 per cent of the heat in the coal passes into the water. In locomotive practice very rarely as much as 50 per cent. There is, therefore, a shrink of about 30 per cent in coal efficiency to be charged to design and conditions of operation. Two-fifths of this might possibly be eliminated and if distributed might be apportioned as follows:

33—Eff. 99 per cent. Design of firebox.

34—Eff. 98 per cent. Size of firebox.

35—Eff. 95 per cent. Diameter and length of tubes.

36—Eff. 95 per cent. Front end design. In an English test 375 hp. out of 2,000 was used in creating draft. M. C. M. Hatch, superintendent fuel service, D. L. & W., states that only 19 per cent of front end vacuum pump is effective at fire.

37—Eff. 98 per cent. Poor ash pan design. Air openings should be 14 per cent of grate openings and about 100 per cent of tube opening area.

38—Eff. 98 per cent. Grate openings.

39—Eff. 95 per cent. Radiation.

40—Eff. 95 per cent. Economies due to compounding do not become manifest unless the pressure exceeds 180 lb. Can be estimated at 5 per cent.

41—Eff. 95 per cent. Economies due to superheat.

42—Eff. 98 per cent. Preventable friction in machinery, valves, pistons, rods, bearings.

43—Eff. 99 per cent. Wheels of different diameter, as either ahead or slightly shifted from middle line.

44—Eff. 99 per cent. The difference in economy between high and low steam pressure is discernible.

45—Eff. 99 per cent. Direction of draft through locomotive. End result is about 69 per cent.

#### *D.—Wastes Due to Poor Firing.*

46—Eff. 99.5 per cent. Building fires. The loss is relatively great, but on the aggregate, small.

47—Eff. 95 per cent. Smoke and sparks. Too little air. M. C. M. Hatch states that at 2,000 lb. coal fired per hour, the coal loss in sparks is 1.5 per cent; at 7,000 lb. it is 12 per cent. To put the loss in smoke and sparks at 5 per cent is conservative.

48—Eff. 80 per cent. Too much air. This is an invisible but serious loss. Assume 50 lb. excess of air for each pound of coal, the air heated 800 deg. Can lose 0.0686 B. t. u. per lb. per degree. For 800 deg. 54.88 B. t. u's. For 50 lb. excess air this gives 2,744 B. t. u's, or about 20 per cent of the heat units in very good coal. The loss might therefore be 20 per cent.

49—Eff. 98 per cent. Popping and plume—too high pressure.

50—Eff. 99 per cent. Too low pressure. The lower the pressure the less the efficiency of the steam engine.

51—Eff. 99 per cent. Cleaning fires wastefully.

52—Eff. 98 per cent. Dumping fires.

**E.—Waste Due to Poor Running.**—This paper is on a theory and on a method and does not assume to give any proof of the actual losses, which may be more or less than estimated. Undoubtedly losses exist due to poor running, for I have seen letters from firemen narrating the excessive work put on them, and the coal wasted by bad running.

53—Eff. 99.5 per cent. Slipping drivers (harder on the drivers and rails than on the coal pits).

54—Eff. 98 per cent. Full stroke. A train might very easily waste time at a station and the engineer try to make it up by extra steam on the road.

55—Eff. 99 per cent. Throttling in combination with full stroke results in greater steam consumption.

56—Eff. 95 per cent. Dynamometer car tests show variation in horsepower and constant speed when constant horsepower and variable speed is more economical.

57—Eff. 98 per cent. Unwise acceleration. A great consumption of power to gain a few seconds in time.

58—Eff. 98 per cent. Unnecessary braking. This is the opposite of unnecessary acceleration, but is worse, since it destroys not only stored energy but also brake shoes, driver and truck tires and abrades the rails. End result—88 per cent.

If we take the combined efficiency of the engineer and fireman, it appears to be 62.5 per cent or almost two-thirds. But a test made on a switch locomotive reported in *Erie Employes' Magazine* showed that current consumption of coal was reduced 65 per cent by care, not 33 per cent. Tests have been made both as to passenger and freight runs, which show actual consumptions under dynamometer-car records amounting to only one-third of usually charged consumption. On such runs, wastes due to poor design and to interest charges, to paying too much, to unnecessary transportation and to unnecessary handling expenses, are not eliminated, nor losses due to weathering.

Eliminating these we would have the following major sequences:

A	Administrative inefficiencies	60 per cent
B	Shrinks in quantity	92 per cent
D	Poor firing	71 per cent
E	Poor running	88 per cent

End result ..... 34.5 per cent

This sequence in its end result of 20 per cent to 35 per cent checks up well with the special tests made, checks up well with the difference between coal actually required for horsepower



generated and the coal charged to the locomotive fuel account.

To correct the cumulative result in dependent sequence of a number of small evils there should be reliable, immediate and adequate records available from mine to ash pit; an organization capable of handling the problems, and an organization competent to solve the problems.

Railroad locomotive practice is defective as to all these conditions. The records are unreliable, deferred and inadequate. Railroads are very slowly outgrowing the belief that a line officer also necessarily possesses staff competence. The fuel problem is a bigger one than records and a specialized organization. These are the tools wherewith results can be obtained, but before we use tools we must have an organization able to use them, an organization competent to expand and supplement the present cramped type.

**Discussion.**—The paper was well received, the members approving of the broad basis on which it was written. The subject of fuel economies is of so vital importance that all of the higher railroad officers should take an active interest in it. While the mechanical department is directly interested in the consumption of fuel, there are a great number of ways in which the other departments can assist substantially in saving fuel. For this reason it is believed that more decisive action should be taken by the officers in order that the necessary authority be given for a comprehensive and effective fuel economy campaign. Several members demonstrated as to how the transportation department could be of material assistance. On some roads transportation officers have been included on the fuel committees with excellent results, but there still seems to be a feeling that the general officers do not give the fuel problem the attention which it deserves. Tests have shown that large savings may be made in fuel consumption by providing more supervision on the locomotives. It was believed that if the division superintendents were kept accurately posted as to the actual units of fuel consumed more direct benefits would result.

### SMOKE PREVENTION

BY E. W. PRATT

Assistant Superintendent Motive Power and Machinery, Chicago & North Western

In 1912 and 1913 elaborate tests were made on the locomotive testing plant of the Pennsylvania Railroad at Altoona, Pa., and a complete report made in 1913 to the American Railway Master Mechanics' Association, with recommendations covering the application of steam-air jets, quick-action blower valves, etc. Since that time practically every locomotive operating in the city of Chicago has been equipped with such apparatus and it has been conclusively proven that soft coal burning locomotives may thereby be kept comparatively free from smoke if the engine crew be given and observe proper instructions at all times.

The smoke inspection bureau of the city of Chicago has accepted these devices as standards and recommends them to those inquiring. This bureau consists of the city smoke inspector, two assistants, ten mechanical engineers and nine deputy observers, covering not only the railroads but the entire city. The expense to the city is about \$39,000 per year. The railroads in Chicago have a total of 54 smoke inspectors representing an annual expenditure of about \$65,000. A railroad smoke inspectors' bureau, under the direction of a sub-committee of the General Managers' Association of Chicago, has been formed. This is composed of the chief smoke inspectors of all railroads in the city and holds its meetings bi-weekly, inviting thereto all railroad men interested in smoke prevention.

The railroad inspectors are required to report all engines they observe emitting dense smoke on a duplicate post card printed with the form shown herewith. One part of the card is mailed to the joint smoke inspection bureau through the U. S. mails, and the other is sent to the proper officer of the violating road through the railway mails. The bureau makes bi-weekly summaries of the reports for the different roads showing the num-

ber of reports filed, the number of locomotives operated in Chicago, the percentage of locomotives reported, the average density of the cases reported and the number of reports made by the inspectors of each railroad. These reports are for the private use of the railroads and are not furnished the city. However, the work of the railroad bureau is heartily approved by the city authorities and has been productive of greater co-operation between the various railroads, so much so that the smoke reading made by the city the year following its inception was over 50 per cent lower.

At the present time all city inspectors are instructed to each read locomotive smoke for a total of two hours each day. This to be done in one period or in several periods of 15 minutes or more. These inspectors being assigned to various districts in the city make it certain that the railroad observations will

JOINT SMOKE INSPECTION BUREAU OF RAILROADS OPERATING IN CHICAGO						
Date _____ 191__						
Inspector _____						
of _____ R. R. noted following cases of dense smoke emission on above date:						
ROAD	Eng. No.	TIME		DENSITY No.	LOCATION	REMARKS
		FROM	TO			

### Postal Card Form for Smoke Inspector's Report

not be confined to any one locality. From these observations the city issues monthly and semi-annual reports. All readings are made in accordance with the Ringlemann method of determining smoke density and the *engine minute* is the unit employed. It should be understood that the city smoke bureau construes one minute of No. 3, 4 or 5 smoke as a violation of the law.

An *engine minute* covers the observation of one locomotive during the entire minute. During this minute 14 seconds or less is not counted; 15 to 44 seconds is counted as one-half minute; 45 to 74 seconds is reported as a full engine minute. One-half minute of No. 3 density is 1.5. One-half minute of No. 1 density is 0.5, etc. The per cent smoke density is obtained by multiplying the smoke units by twenty (each Ringlemann unit being 20 per cent) and dividing the product by the total engine minutes.

In order that the city inspectors shall read the smoke density correctly, applicants for these positions pass through a probationary period during which time, under the direction of an experienced inspector, they make thousands of smoke readings with a full size Ringlemann chart set up 50 ft. from them in the direction of the stack under observation. These men are under civil service and their standing is based largely on their ability to correctly read smoke density. The members of the Railroad Smoke Inspectors' Association and the city inspectors frequently have joint classes in the reading of smoke density in order that uniformity may be obtained in the case of independent individual observations.

One of the encouraging features of this plan is that it has so fully met with the approval of the city smoke bureau that the latter has voluntarily opened all their record books to members of the railroad bureau, and the reduction in the per cent of density of railroad smoke during the past two years has been remarkable. It is as follows:

1912.....	10.74 per cent
1913.....	6.06 per cent
*1914.....	7.41 per cent

\*The figure for 1914 was made up from the Summer reading of 1914 (by old method) and the reading for September, October and November, 1914 (by new method). This figure would be lower but for the change in method.

## STANDARDIZATION OF COAL PREPARATION

By H. C. ADAMS

President, Jones & Adams Coal Company

The present method of screening has caused no end of trouble in marketing the coal, and various losses to the producer. There is never a time in the year when a market can be found to fit the various sizes that are now being made. This results in large quantities of coal being put on the market for any price the customer is willing to pay. It displaces the size the consumer would ordinarily use and which the operator wants him to use, and destroys any profit that might be secured.

No way has been found to store unmerchantable sizes of coal at the mines in large quantities, as this would mean storage for every size produced at times. During the summer months 6-in. lump is made in great quantities in excess of the demand, and frequently sells at mine run prices, or less. In the fall and winter other sizes are made in excess of demand, so to store coal at the mine it would mean to make room for half a dozen sizes, and the operators have not the room or capital to do this.

The railroads at times have their tracks crowded with dead-loads of coal of various sizes, for which there is no market, when this same equipment could be used to advantage in other directions.

Approximately 100 tons of mine run coal, as it is prepared to-day in Central Illinois, will screen out about as follows:

6-in. lump and larger.....	30 per cent
6-in. by 1¼-in. egg .....	35 per cent
1¼-in. screenings .....	35 per cent

If an operator today has an order for 300 tons of 6-in. lump coal, it is necessary to dig about 1,000 tons of mine run to get it, which gives about 700 tons of coal that he may or may not have a market for.

If all coal preparation was standardized so that the lump coal would be made over an inch and a quarter screen, and the operator had an order for 300 tons of lump, he would only produce, on the same basis of figuring 450 tons. Of this amount of coal, only 150 tons would be 1¼-in. screenings, and in most cases would be easier to sell than the first mentioned separation.

The benefits of standardization are numerous: It would reduce the output to a point where the mine would get running time that would greatly reduce the cost. A great many cars that are now constantly tied up with unsalable sizes would be released and could be used for any other purpose. The operator would not be producing two or three tons of sizes that he has no market for in order to get a ton of the size coal he wants. The railroads for their fuel could use either inch-and-a-quarter lump or mine run, as they deem best, and either of these sizes could be produced in quantities required at all times, for the reason that no unsalable sizes would be produced in order to supply railroad coal. The railways are and should be interested in any move that will benefit the operator. A very large percentage of the freight of some of the roads is coal, and when coal cannot find a market, or perhaps finds an unprofitable market, the railway is sure to feel the effect in the lessened prosperity of the operator and his inability to seek broader markets.

**Discussion.**—The railways must co-operate with the mine operators if a standardization of fuel is to be obtained. It was shown that by doing this in one case the sizes produced by one operator were reduced from 22 to 6, the railways using coal which the operators found it difficult to market.

## FUEL STATIONS

The committee deemed it advisable to consider three separate and distinct sub-divisions of the subject as follows: Plant storage for reloading through the medium of cars; plant storage for direct issue to plant, and central storage for distribution to miscellaneous plants. The committee suggests the use of a locomotive crane with a clamshell or similar device for unloading and reloading storage coal, where the amount to be stored is less than 5,000 tons and where the daily issues are small enough to permit of its use.

A cheap method of unloading cars is to use a trestle from which the coal can be automatically dumped. Such a plant could be located adjacent to the coaling station, if the space is not too restricted and the track arrangements permit. Another method is to erect a timber trestle adjacent to the track on which locomotives are coaled and grates cleaned, provided with a runway for a locomotive crane equipped with a clamshell or grab bucket. A plank wall or barrier should be placed along the side of the trestle contiguous to the storage pile, to prevent the coal from accumulating under the trestle. A strip of land about 60 feet wide, and varying in length in proportion to the capacity of the pile would be required for storage. The plan provides for a capacity of 28 tons per lineal foot of coal pile. The coal will be delivered to the coal-receiving track (on the outside of the engine track) in gondola cars of practically any type, from which it will be removed and transferred to the storage pile by the locomotive crane. If desired, this plant may be used for coaling engines either from cars on the receiving track or from the storage pile. It is not considered advisable to use this plant as a locomotive coaling station at terminals where a large number of engines are coaled.

From somewhat meager figures available it is estimated that with these plans coal can be stored from cars, or reloaded from storage at about 2½ cents per ton.

All new mechanical plants should be so designed as to provide a storage adjunct to permit of unloading coal into the receiving hopper, from which it may be distributed, either to the plant direct, or to a storage pile when business is dull and there is a surplus of road cars and of coal. The plant must be so designed as to permit of the recovery and issuing of the coal from the storage pile through the plant without the use of road cars.

The locomotive crane may be used to good advantage for taking care of ground storage in connection with a mechanical coaling station. This plan has been adopted by the Louisville & Nashville, at three places, where large mechanical coaling stations of reinforced concrete and steel construction are being erected. The receiving hopper is enlarged at the back to form a pit of sufficient size to accommodate the grab bucket of the crane. The crane is located on a circular track back of this hopper, this track centering on the hopper. Coal is dumped into the hopper from the receiving track, and handled to storage by the crane. In reclaiming from the storage pile, coal is picked up by the crane and discharged into the hopper, from which it is handled to the overhead coal pocket in the usual manner. For the most economical operation, such a crane should be electrically operated. Such a plant is estimated to cost \$23,000 and has a capacity of 22,000 tons.

With the bridge type, the receiving hopper pit is constructed practically the same as for the locomotive crane. This type lends itself to a much larger storage pile and greater handling capacity than the locomotive crane, but it is, of course, more expensive. The inner trucks of the bridge run on a circular track and are held in position by an arm extending to a central swivel point. The outer trucks also travel on a circular track, the center of the circle being the swivel point above referred to. Coal dumped into the pit at the side of the receiving hopper of the coaling station, is picked up by the grab bucket on the bridge, and placed in storage. A swivel bridge of latest design can be constructed for complete above the rails, for from \$25,000 for 100 ft. span, up to \$50,000 for 250 ft. span, and handling from 100 to 300 tons of coal per hour.

The cable and drag scraper method has been adopted by the Southern Railway, the Canadian Northern, and others. The storage pile is located directly back of the receiving hopper of the coaling station on a large elliptical area. The coal is dumped into the hopper and conveyed to the top of the coal pocket by the usual mechanical means. Instead, however, of dumping into the coal pocket, the coal is deflected into a chute which carries it out into the storage area. The coal is then spread over this area by means of a drag scraper operated from a drum in a tower over the hopper. Located at intervals



around the storage area are pulling poles to which are attached snatch blocks for the endless cable. This method has the advantage of low first cost and low cost of operation, but causes a great degradation to the coal.

The cableway excavator method contemplates having the storage pile between the receiving hopper and the coal pocket, and is particularly well adapted to a storage of 2,000 or 3,000 tons. A mast is provided at the coal pocket of sufficient height to enable the drag bucket to dump into the bin. Directly behind the receiving hopper, anchorages are provided for the main cable. The hopper is so constructed that the drag bucket may scrape toward the coal bin over a sloping concrete floor. In reclaiming, the coal is picked up by the drag bucket, and deposited directly into the coal pocket, ready for locomotives. This is a very economical system, and has the advantage of not requiring additional machinery for the coaling station. It also lends itself very readily to "under-water" storage.

A central storage plant should provide for the storage of from 100,000 to 500,000 tons, and each plant should be as elastic as possible. It should be located at some convenient central distributing point. It should be as near permanent in its construction as possible, and be so designed and constructed that it could be protected at all times without much expense for maintenance, operation and care. It is believed that a modern plant, answering all practical purposes, can be installed for 100,000 tons of coal for an outlay of from \$30,000 upward.

[The committee included in its report a description of the coal storage plants at the Panama Canal as representative of the latest practice, the matter being taken from the annual report of the Isthmian Canal Commission for the year ending June 30, 1914.—EDITOR.]

#### WEIGHING AND MEASURING DEVICES AT FUEL STATIONS

The committee recognizes the absolute necessity for having correct efficiency performance records of individual locomotives and enginemen, and believes that the railroads and their executives are prepared to spend certain moneys for proper auditing, but that they desire more reliable results and want to know the actual facts as to what their locomotives and enginemen are doing. Fuel accounting should be considered from two separate and distinct standpoints: That of value and that of quantity. The individual coal plant, locomotive and enginemen should be charged with that which it or he receives, and credited with that which it or he issues and uses. No adjustments of any character should be included in the published statements showing individual performances. It is deemed advisable to suggest the adoption of some reliable automatic means of weighing and measuring, and devices that might be cheaply installed, operated and maintained; not only on new plants being installed, but also that might be applied to plants that are in operation. The committee suggests that this subject be again referred to them, believing that additional methods of establishing an automatic and reliable record of the actual amount of coal issued by each plant to each locomotive and each engineman will be on the market during the coming year.

The report is signed by H. J. Slifer, chairman (Cons. Eng.); E. A. Averill (Standard Stoker Company); E. E. Barrett (Roberts & Schaefer Company); W. E. Dunham (C. & N. W.); H. B. Brown (I. C.); G. W. Freeland (Williams White & Co.); W. L. Krausch (C. B. & Q.); R. A. Ogle (Ogle Construction Company); D. J. Madden (Erie), and J. L. Rippey.

This covers the proceedings for the first two days of the convention—Monday and Tuesday of this week. A report of the remaining sessions will appear in next week's issue of the *Railway Age Gazette*.

**RAILWAY EXTENSION IN ARGENTINA.**—It is reported that a bill authorizing the construction of a branch line from Santa Fe to Puerto Reconquista will be introduced in the next session of the legislature of the Province of Santa Fe. Railway extension work at the present time is practically paralyzed and even if the line is authorized, some time must necessarily elapse before work on it can be started.

## WESTERN RATE ADVANCE CASE

The hearing at Chicago in the Western rate advance case, presided over by Commissioner Daniels and Examiner Watkins of the Interstate Commerce Commission, was concluded on May 13, with the introduction of several rebuttal witnesses on behalf of the railways. The protestants had concluded their case the day before. First briefs are to be filed by June 10 and reply briefs by June 20, and oral arguments are to be held at Washington beginning on June 22. The hearing was begun in Chicago on March 4, and has been held daily. During the past month or so many night sessions have been held. The printed record in the case has run to nearly 15,000 pages, while the number of exhibits presented on both sides was 1,060. During the hearing 140 witnesses were heard, 55 appearing for the carriers and 85 for the protestants.

The rebuttal testimony of the railroads included statements by representatives of the Union Pacific, Great Northern and Northern Pacific to show that their companies would receive only very slight increases in revenue from the proposed advances, which are confined mainly to Western Trunk Lines and Southwestern Tariff Committee territory. These were introduced in reply to the contention which has been raised by the protestants throughout the hearing, that the statistical exhibits introduced by the railways were not representative because these roads had taken no part in the case. L. R. Capron, assistant general freight agent of the Northern Pacific, stated that the Northern Pacific's revenues would be increased about \$3,000 a year by the advances on coal and about \$2,000 by the advances on grain.

E. H. Hawley, of the freight traffic department of the Union Pacific, said that his company would receive approximately \$8,000 increased revenue from the advances on hay from Kansas and Nebraska to points east of the Missouri river; that it is slightly interested in the livestock advances but the greater part of its traffic on livestock stops at the Missouri river and is not affected. A telegram was presented from the Great Northern saying the increase in revenue which that company would receive from the advances is only about \$20,000 a year. The witnesses testified that while some of the rates would be advanced on some traffic originating on their lines, the advances usually do not apply to their portion of the haul.

Clifford Thorne, of the Iowa commission, contended that these roads should be included because they are interested in a general movement of western roads to advance rates, and are interested in the tariffs eliminating certain "free services" which were originally included in this case but have been transferred to separate dockets. Mr. Capron and Mr. Hawley said that the increases in revenue which their roads would receive from these tariffs were very small. At the request of Luther M. Walter, representing Morris & Co. and other packers, Commissioner Daniels finally made a ruling directing the Great Northern, Northern Pacific and Union Pacific to file division sheets covering the tariffs included in the commission's suspension order.

Just before adjournment Mr. Thorne made a request that the commission allow the introduction as evidence of a large number of exhibits compiled by W. J. Lauck to show the "prosperity" of the roads, and used by him in the recent arbitration proceeding on the engineers' and firemen's wage demands, in which he appeared as statistician for the brotherhoods. Mr. Thorne said that it had been intended to ask for permission to file the entire set of exhibits, comprising about 4,000 pages and representing a cost of \$100,000, but as the commissioner had indicated during Mr. Lauck's testimony that he considered a large amount of this material irrelevant, he had decided to ask to file only a selected number of the exhibits. Commissioner Daniels ruled that they could not be introduced.

E. B. Boyd, chairman of the Western Trunk Line Committee, introduced some exhibits in reply to criticisms which had been made by witnesses for the protestants on his original exhibits and to correct some figures in the record on the amount of grain traffic involved in the case. He said that A. E. Helm, of the Kansas commission, in trying to show how many tons of grain

the railways transported from Kansas had included over 6,000,000 tons of corn cobs, by multiplying 30,000,000 bu. of corn by 70 lb., instead of using 56 lb. per bushel for shelled corn, which is the form in which corn is shipped. He said the protestants had used figures showing the total production of grain in various states, which includes a large amount of grain not shipped out of the state.

F. S. Hollands, assistant general freight agent of the Chicago Great Western, testified regarding rates on hogs in Minnesota and Iowa; Conrad Spens, assistant freight traffic manager of the Chicago, Burlington & Quincy, testified in reply to statements by protesting witnesses that the advance on livestock to Chicago would change the routing of the traffic, and F. P. Eyman, assistant freight traffic manager of the Chicago & North Western, explained that rates from Chicago to Wisconsin on livestock had not been advanced on account of the competition with Milwaukee, since the rate from Milwaukee to Wisconsin points is a state rate and cannot be advanced in the present case. N. D. Ballantine, assistant to second vice-president of the Chicago, Rock Island & Pacific, testified regarding the handling of livestock traffic, saying that the railroads' contention that the livestock traffic reduces the efficiency of train operation had been proved by exhibits of the shippers themselves.

J. Pease Norton, bond expert, was placed on the stand as a witness for the state commissions to testify to some additional exhibits showing the yields on various classes of bond issues for the purpose of showing that the credit of railway companies is improving in relation to that of governments and industrial and public utility companies. He presented a compilation for a large number of bonds showing the net proceeds. M. O. Lorenz, statistician for the Interstate Commerce Commission, contended on cross-examination that the list of railways selected by Mr. Norton was unrepresentative, since with only one exception, they have been consistent dividend payers, and their bond prices therefore would not correctly reflect a decline in credit since 1910. Dr. Lorenz also showed that the increase in the proportion of bonds to stock indicated that some factor was at work which affected the credit of the railroads adversely. Mr. Norton attributed the decline in the price of bonds partly to the increase in the production of gold, saying that the bondholder knows his principal when repaid will purchase fewer commodities and naturally wishes a higher rate of interest. Doctor Lorenz asked if this rise in prices would not have some relation to railway rates. Mr. Wright, on cross-examination, showed that improvements in the character and value of a road making the bonded indebtedness a small proportion of the value would have an influence on the price of the bonds, and also that many of the railroad bonds were seasoned securities, whereas the industrial issues were new. He said the comparison of a stable, seasoned security with newer and unsettled issues was worthless. "Ought not the rate of return of the railroad to go up if the interest and commodity prices have gone up following the increase in gold production?" asked Mr. Wright. The witness claimed that earlier railway rates were too high, so that no increase was necessary.

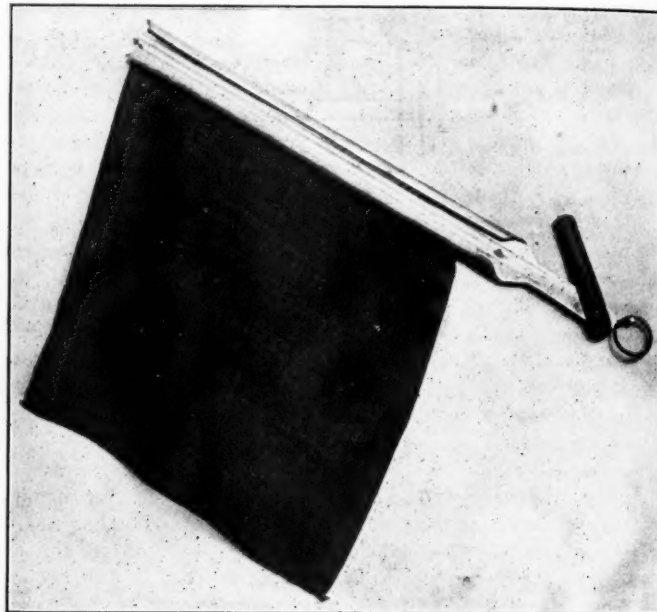
A. N. Bean, an examiner of accounts for the Interstate Commerce Commission, testified as a witness for the commission to present the results of inquiries which had been addressed to the railways, asking an explanation of the increase in operating ratio. He had made a compilation of the replies, showing that the principal causes named by the railroads were increased wages, increased cost of fuel, increased price of ties, larger expenditures for maintenance of road and equipment, increases in taxes, more numerous requirements of state and federal statutes, decreases in revenues with reductions in rates and the introduction of depreciation charges.

**RAILROAD CONSTRUCTION IN PORTUGAL.**—The government of Portugal has authorized by presidential decree the Administrative Council of the State Railways to spend about \$300,000 for the immediate construction of branch lines from Condomil and Ermezinde to Leixoes.

## A FLAG AND TORPEDO HOLDER

The illustration shows a flagstaff which has been designed as a convenient holder for torpedoes, doing away with the present methods of carrying them in a sack with a draw string, or of twisting the lead straps around the flag and stick. By this device they can be taken from the container without removing gloves in cold weather. There is also no chance of losing the torpedoes.

The staff is made of galvanized sheet iron, bent as shown, the handle being split into two parts and connected near the ring. The part of the handle on one side is fastened by two bolts, while the portion of the handle on the side shown in the illustration is pivoted by one of these bolts. The staff is corrugated



Combined Flag and Torpedo Holder

its full length to give stiffness. When it is desired to put torpedoes into the staff, the handle is moved on the pivot to the position shown and the torpedoes are inserted in the slot, which will hold 12. The handle is then turned down on the pivot until it occupies its normal position, at which point it acts as a lock and prevents the torpedoes from coming out. The handle is also locked by the corrugation. At the top of the flagstaff the two corners are bent over to prevent the torpedoes being removed at that end.

The flag is fastened by a rod run through the hem, the lower end of the rod passing under the stationary half of the handle and the top end being bent and passing through a hole in the body of the container. A cotter key fastens it in place. This torpedo holder was designed and patented by W. J. Strohm, Moline, Kan.

**HIGHER RATES BETWEEN SCOTLAND AND IRELAND.**—The cross-Channel shipping companies having recently intimated an increase in their rates for the sea portion of the journey between Scotland and Ireland, the five chief Scottish railways (Caledonian, Glasgow & South-Western, Great North of Scotland, Highland and North British), have given notice of an increase of 1s. 3d. (30 cents), a ton in their rates on merchandise between stations on their lines and ports and stations in Ireland. Live stock rates between certain Scottish stations and the ports of Belfast, Larne, Newry and Dundalk are also to be increased to the extent of the increase in sea transit charges, which is 1s. (24 cents), per head for horses, 6d. (12 cents), per head for cattle, and 3d. (6 cents), per head for sheep, lambs and pigs. Similar notices applying in the reverse direction have been issued by some of the Irish railway companies. The increases are effective June 1.



# Maintenance of Way Section

In the April maintenance of way section we devoted considerable space to the renewal of ties. In this issue are found similar articles relative to the relaying of rail. We plan to continue these timely discussions in the June maintenance of way section, in which we will discuss particularly, the ballasting of tracks. We invite contributions on important phases of this subject, including the kinds of ballast best adapted for lines of different densities of traffic, the organization of forces, the relative merits of heavy and light raises, the classes of labor best suited for work in ballast gangs, etc.

## Handling Ballasting Work

The Lehigh Valley has laid 160,000 tons of rail during the past five years without spacing ties. The statement by G. L. Moore, in an article on another page describing the methods of laying rail on this road, that "we have yet to find the first case of damaged rail by reason of not spacing joint ties, but have been able to greatly improve our track by diverting the labor so employed in former years to the more important work of improving the surface and line and renewing the ties," is therefore significant and of special interest. This practice is gaining ground on a number of other roads, including the Pittsburgh & Lake Erie, the St. Paul and the Illinois Central. While care must be used in the adoption of this method, the results secured on the roads which have given it extensive trial, commend it for serious consideration on main line tracks which are normally maintained to a high standard and on which, therefore, the track is not allowed at any time to get badly out of line and surface.

## Laying Rail Without Spacing Ties

The president of one large railway was led to favor the adoption of ballasted floors on bridges on his lines largely because of the greater sense of security they give to the lay passenger. Another railway officer refuses to allow the high viaducts on his road to be referred to in advertising literature, even though they are excellent examples of engineering design, because of the sense of danger they may create in the mind of the prospective passenger. As outlined elsewhere in this issue, the Pennsylvania and the Lackawanna regularly call their landscape architects into consultation in the design of their passenger stations and the surrounding grounds, even at small outlying points, to harmonize the design with the particular location. Several eastern roads plant flowers systematically about the station grounds each spring, even to the extent of transferring flowers from the hothouses to these various points by special work trains. The Canadian Pacific organized several large extra gangs last fall to cut off all the brush to the right of way fences on the western mountain divisions. These examples illustrate the importance attached to appearances by many railway officers and the expenditures they are willing to make to secure these more or less intangible results. The lesson should not be lost on maintenance of way men, for it is of special significance to them as custodians of the company's property. While many roads have given close attention to the systematic policing of the entire right of way, others have largely neglected it. It costs little or nothing for a bridge crew to burn or otherwise remove the pile heads and odd pieces of timber lying about a job after they have completed their work, or for a concrete gang to level off the small amount of gravel which may be left after the completion of their work. Likewise, it requires little time for

## The Value of Appearances

the section crew to pile and burn the ties removed from the track and to carefully collect and store the scrap at some obscure point about the section house. A certain amount of debris is necessary about a railway. It is not, however, necessary to display it as prominently as is frequently done. The difference between attention to and neglect of this subject is frequently the difference between a favorable and unfavorable impression on the part of the traveling public.

Normally the relaying of rail should be actively under way at this season. This year, however, the work is being seriously delayed. In the first place, the ordering of rails has been seriously retarded, as occurred last year, when only one-half as much tonnage of new rails was laid as in 1913. While some roads, such as the Burlington, the Santa Fe and the North Western, ordered their usual tonnage early this spring, many are still delaying placing the orders for their requirements, one of the most prominent being the Pennsylvania, which is now reported to be in the market for over 125,000 tons. With the large number of rail orders still to be placed, it is evident that the work of relaying the rail in the track will be seriously delayed this year. This introduces a special problem and opportunity for maintenance of way officers. Because of the ample supply of labor available it will be possible to secure gangs of relatively higher efficiency than in previous years. With the reduced amount of work under way it will also be possible for the supervising officers to give more attention to the details of their work. This will permit the organization of more efficient forces and should result in handling the work more economically.

## The Relaying of Rail

### CHANGING EXPENSE INTO REVENUE

THE article entitled, "Income from the Maintenance of Way Department" in another column in which the writer describes the methods by which one supervisor has created an annual income of over \$10,000 from the sale of materials, most of which were previously considered only a cause of expense, opens the way for study in a field to which comparatively little attention has been paid. As stated in this article the maintenance of way department is primarily a spending organization, and attention has been directed almost entirely towards making these expenditures as economically as possible. This is as it should be from the very nature of this department. But this does not necessarily mean the exclusion of other problems with which the maintenance of way department is in most intimate contact, the solution of which may result to the benefit of the company. Up to a few years ago all materials unfit for further use in their present condition were sent to a central point and sold in bulk as scrap. Gradually it was found that the sorting of this scrap into various grades enabled higher prices to be realized. This soon led to the establishment of scrap reclaiming plants on a number of the roads at which much of the scrap material was reclaimed for further service by repairing it or converting it into other materials. This development, however, applies only to materials with a generally accepted scrap value. The disposition of other materials such as ties and cinders, released by the railroads in large quantities, has been regarded as a necessary cause of expense, notwithstanding the fact that in certain isolated localities there was a considerable demand for these materials. The supervisor referred to has developed the latent market for these materials by calling their advantages to the attention of possible purchasers and by letting it be known that they were

for sale. In this way he is only following out the practice of many successful manufacturing institutions whose profits come largely if not entirely from the sale of the by-products. The steel mills formerly were glad to give their slag to the railroads if they would haul it away. Finding that the railroads were glad to secure it, several mills are now able to sell it to the roads at a few dollars per car. The fact that a plan such as is outlined in the article referred to must be worked out carefully and with proper supervision to prevent abuses creeping in should not deter the proper officers from giving it careful consideration, for a sufficient number of savings such as this may mean the difference between unprofitable and profitable operation.

#### LABOR SAVING APPLIANCES

**R**AILWAYS have been slow in many cases to adopt labor saving devices. This has been particularly true in the maintenance of way department, which has lagged behind other departments, and especially behind the construction department, with which it is closely associated. On construction work the station man of a generation ago with his shovel and wheelbarrow has been replaced almost universally with the grading machine, the steam shovel and the dump car, while the track laying machine has largely replaced hand work on new lines. But one still finds maintenance of way work being done almost entirely by manual labor, aided by a few simple tools, as the tamping bar and the pick.

The reason for this is not apparent at first glance. Twenty-eight per cent of all railway employees are in the maintenance of way department, more than those engaged in the maintenance of equipment, the traffic department and the general offices combined, while nearly 60 per cent of all expenditures for maintenance of way and structures go for labor. This very high proportion of labor cost in the maintenance of way department would indicate that there is a great field for the adoption of mechanical appliances here. The relatively small amount of attention given to this subject, may therefore, probably be considered to be the result of neglect and of preconceived ideas regarding the narrowness of the opportunity rather than from an actual lack of a field.

The best indication of what may be done in this line is a statement of the results actually being secured in certain specific instances where special study has been given not only to the use of mechanical appliances in general, but to means whereby these appliances may be used to the best advantage. Such an instance is the description of the results secured in handling rail out on the line by the use of locomotive cranes, ditchers and derricks on the Lehigh Valley, described in another column. Not only is the picking up of nearly 11 track miles of rail in one day an unusual record, but the manner in which the equipment is regularly handled to secure this result at a cost of only 18 to 23 cents per ton is most unusual. This is only one of many details of maintenance of way work to which power equipment can be applied with corresponding savings. The motor car carrying a power unit provides an opportunity for the use of a wide variety of auxiliary equipment, such as rail drills, tie tampers, portable rail saws, etc. These experiments deserve the hearty support and sympathetic co-operation of maintenance of way men, not only for the results they may produce directly but because of the further improvements to which they may lead. It is the experience of railway supply manufacturers that many railway men are prone to give an adverse opinion regarding a labor saving device without giving it a trial. It is fully as much to the interest of the railroads as the manufacturers for labor saving devices to come into universal use as rapidly as possible, and the quickest way to develop such devices is to experiment with them. There is no more productive field for the reduction of maintenance of way expenditures today than in the replacement of manual labor with mechanical power. Human labor is almost invariably the more expensive.

While a shortage of labor is not to be expected this year, it is only a question of time until this condition will exist, as it does at regular intervals. At such times, when labor cannot be secured at any cost, the value of power equipment cannot be measured solely by its savings. During a season such as this when the indications are that only a moderate amount of work will be carried on, there is more opportunity to study, experiment with and develop new devices than in busy seasons when everyone is working under pressure. This subject should, therefore, receive careful attention this year.

#### NEW BOOKS

*Plain and Reinforced Concrete Arches.* By J. Melan, professor of bridge design at the German Technical School at Prague. Translated from the German by D. B. Steinman, professor of civil engineering at the University of Idaho. Size 6 in. by 9 in., 161 pages, 43 illustrations, bound in cloth. Published by John Wiley & Sons, Inc., New York City. Price \$2.

The increasing use of concrete arches by railways makes any discussion of the design of such structures of interest to many engineers, and the prominent part which Professor Melan has taken in the development of arch design will serve to introduce his work to many. The book discusses briefly the fundamental arch principles and the stresses existing in an arch and then develops various analytic and graphic methods of analyzing and designing hingeless, one-hinged, two-hinged and three-hinged arches. Other chapters consider the effects of temperature, the displacement of abutments, non-vertical loads, etc. The last chapter covers a method of calculating the stresses in an arch by means of a chart, the use of which is illustrated by numerical examples. In making the translation from the German the notation has been modified and a preliminary index showing all symbols used is inserted for the guidance of the reader. In its diction and phraseology the book bears little evidence of its foreign origin.

*Railroad Field Manual for Civil Engineers.* By William G. Raymond, professor of civil engineering and dean of the College of Applied Science, State University of Iowa. Size 4 3/4 in. by 7 in., 405 pages, 31 figures, 83 tables. Bound in leather. Published by John Wiley & Sons, Inc., New York City. Price \$3.

The most striking feature of Raymond's Field Manual, just issued, is the use of decimal divisions of degrees in the tables in preference to the more common system of minutes and seconds. The author's reasons for this departure from ordinary practice are stated quite fully in the preface and are based on the convenience in laying out curves with a vernier graduated to read hundredths of degrees and the elimination of the necessity for transposing minutes and seconds to decimals, or vice versa in the solution of curve problems. Instrument makers quote a price of about \$20 for changing the verniers of an old instrument and make no difference in the cost of new instruments with such verniers. About 50 engineers, including chief engineers of railroads, independent practising engineers and railroad engineering professors were practically unanimous in their opinion as to the desirability of such a change. It is pointed out that the adoption of the decimal division of the degree does not change the unit, as was the case in the attempted change to the metric system, but is comparable rather with the adoption of the decimal division of the foot in surveying work which is now very general. An endeavor has been made, however, to make the book applicable in case any individual user does not desire to change the system of dividing the degree.

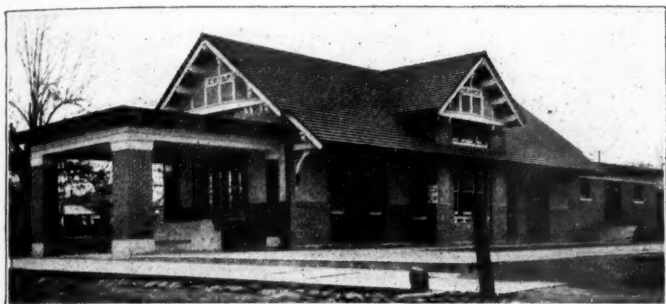
The book is intended primarily for field use and five-place tables have been adopted as representing the greatest degree of precision warranted. The book includes tables and explanatory statements covering curves, the ten-chord spiral, logarithms and trigonometric functions, location tables, construction tables, turn-outs and crossovers, azimuth, latitude and time, tables for metric curves, the adjustment of instruments, and miscellaneous tables.



# The Design and Construction of Small Stations

## Resume of Current Practice on Several Roads in the Selection of Materials and the Arrangement of Facilities

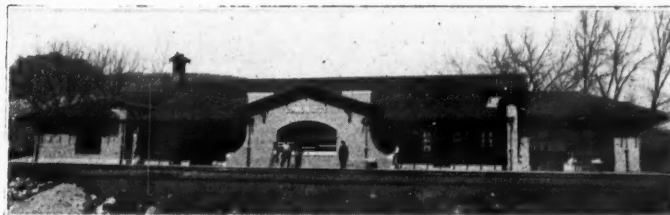
It is estimated that the railways of the United States maintain 85,000 passenger or combination passenger and freight stations, and that fully 80,000 of these are buildings costing \$25,000 or less. From these and similar estimates it can be shown that the total value of the small stations is at least equal to that of the large stations and that the annual cost of replacing buildings in the two groups also is roughly the same. Disclaiming any high degree of accuracy for these estimates, they are still sufficient to show the importance of a class of construction which is too



A Brick and Stucco Building on the Rock Island

often given slight consideration. A \$1,000,000 terminal has in its design and construction far more to inspire the architect and engineer and to interest the executive officer than an equal expenditure in assorted sizes of small stations, but the opportunities for effecting economies through careful study of the requirements are at least as great in the latter case as in the former, since such an expenditure might cover 200 buildings located in as many communities of widely differing characteristics. There has been a marked tendency in recent years to provide better station buildings at all points and the number of roads that allow their property to remain the most unsightly spots in the communities they serve is fast decreasing. A number of factors are responsible in varying degrees for this movement. In some cases,

The scale by which to measure the suitability of a passenger station to the needs of a community is extremely hard to fix. The revenue from ticket sales is an index of the passenger business originating at a given point, but it might be misleading as a guide to the kind of a station needed, for some towns producing relatively little passenger traffic are good sources of freight revenue, and therefore a somewhat disproportionate expenditure for passenger facilities may be justified by the increased freight traffic resulting from the more cordial relations set up with the people. On the other hand, a rough mining or manufacturing town which would produce more passenger and freight business than a suburban or rural community of equal size might be adequately served by a less expensive building. The amount of transfer business must also be considered for at some stations at junctions or crossings the amount of either passenger or freight traffic originating may be insignificant, but the fact that such a station must be used by a large number of through passengers when changing trains, makes it essential for the repu-



A Small Station on the Santa Fe in the Southwest

tation of the road that comfortable and commodious quarters be provided.

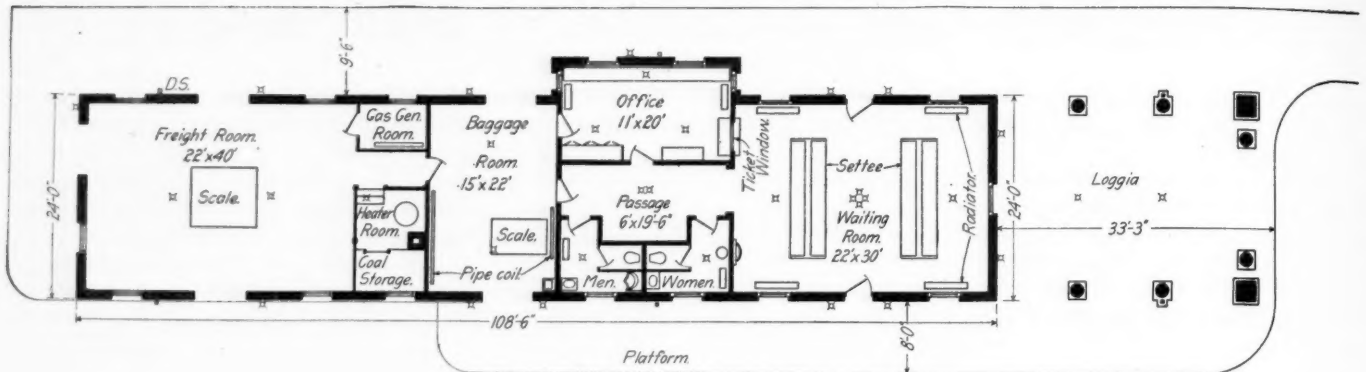
These facts emphasize the necessity for careful study of the nature of each problem to insure the wisest investment in stations, and such studies should preferably be made jointly by representatives of the operating, traffic and engineering departments. On some roads standard designs are used for the very small



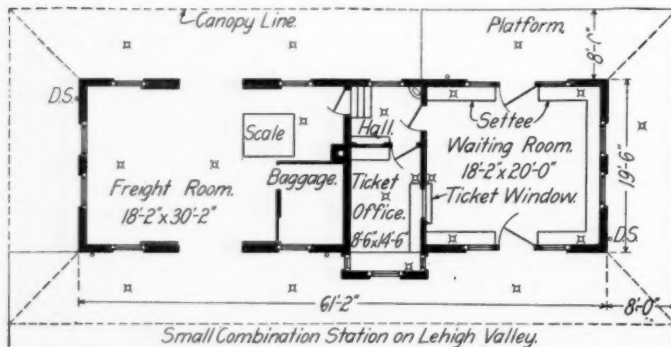
One of the Santa Fe's Brick and Stucco Stations, Showing a Suggestion of the Mission Style Used Extensively on That Road

competition, local demands, or the authority of a state commission have made necessary heavy expenditures for new stations, but the underlying reason in general is the growing spirit of co-operation between the public and the railroads which is resulting on one side in an increased desire to see the roads fairly treated and on the other side in more active efforts to give the people satisfactory service in every respect.

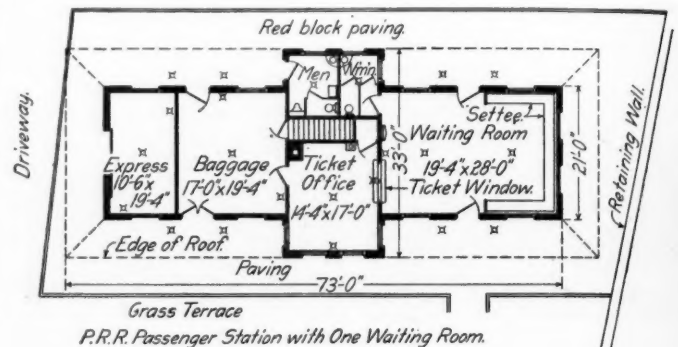
buildings, and if, on investigation of the community, the old facilities, and the probable requirements, one of the standards is found suitable, there is, of course, no necessity for drawing a new plan for that building. The evident advantages of standard structures are offset, however, in the minds of many railway men by the monotonous appearance of similar buildings recurring frequently along the line and the tendency if standards are followed



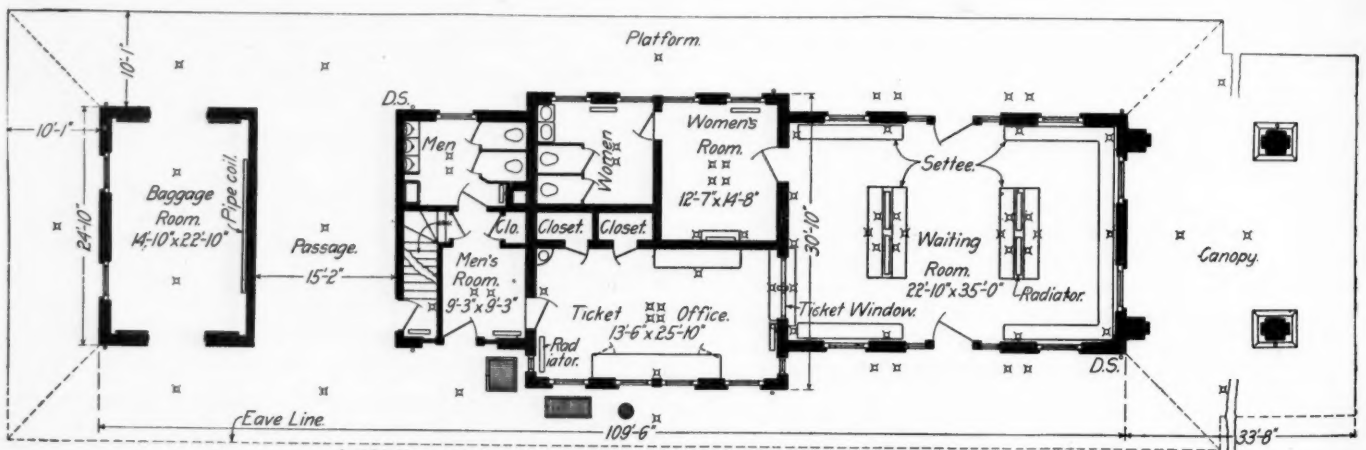
D.L. &amp; W. Combination Station with Separate Freight and Baggage Rooms.



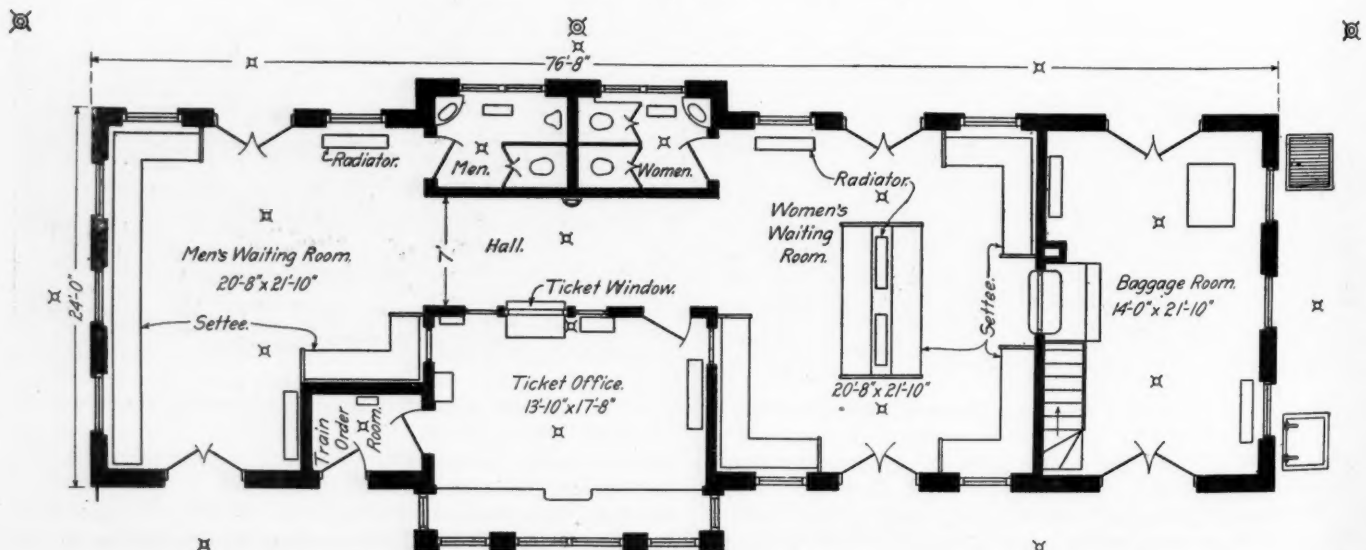
Small Combination Station on Lehigh Valley.



P.R.R. Passenger Station with One Waiting Room.



L.V. Station with Main Waiting Room and Small Men's and Women's Rooms.



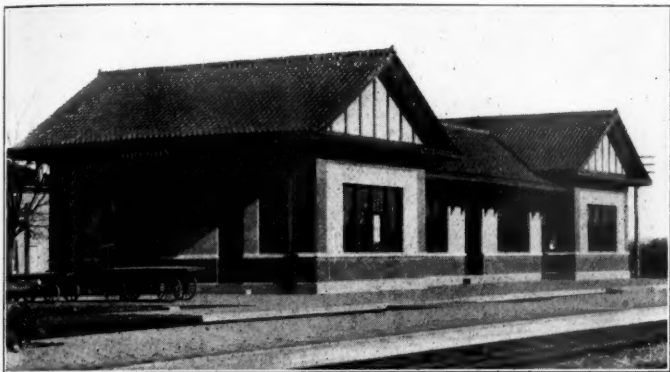
Small Station on B.R. &amp; P. with Two Main Waiting Rooms.

Five Small Station Plans, Showing a Variety of Arrangements of Passenger and Combination Freight and Passenger Facilities



to adopt one of these in preference to a special design much better adapted to the local requirements.

A station which fully meets the needs must provide adequate and convenient facilities for the sale of tickets, checking, handling and storing of baggage, receiving, delivering and storing of express and in combination stations, of freight; must contain public rooms of ample dimensions in which are installed all the commonly recognized provisions for the comfort and convenience of the road's patrons; and must have a pleasing appearance inside and out, the latter requirement covering also the surrounding grounds. Considered as an investment, all of these requirements must be met in a building that will have the lowest possible first cost consistent with long life and low maintenance charges. In an endeavor to co-ordinate the experience of various roads in the solution of such problems, a study has been made of the practice on eight typical roads where considerable attention



**A Brick Station on the Burlington Showing a Limited Use of Stucco**

has been given to the matter and the following discussion presents the variations in details of design and construction with the reasons for each arrangement or material where possible.

#### ARRANGEMENT

For the smallest villages and towns it is customary to provide a combination freight and passenger station. Such a building, as shown in one of the floor plans reproduced herewith, may have only a waiting room, a ticket office and a freight room, which also serves for baggage and express, or a separate baggage room and toilet rooms may be added. In somewhat larger towns separate freight and passenger facilities are warranted. In a station for passenger traffic only, a main waiting room, women's retiring room, men's smoking room, toilets, ticket office and baggage room are usually included, although some roads frequently use two separate main waiting rooms where the traffic warrants, or in communities with a large number of foreigners or a rough population, and this arrangement is of course necessary in many of the southern states where the law requires separate quarters for white and colored passengers. Two waiting rooms, however, cut up the plan more than a single main waiting room and they are less easily heated. A train order room must frequently be provided in small stations. Particularly for suburban towns, it is not uncommon to include in the plan a loggia or pavilion, adjacent to a drive, or at one end of the building where exceptionally large crowds can find shelter.

The size of the building and the arrangement of rooms must in general be decided on to meet the local requirements. The stations of the class referred to, are usually 20 to 25 ft. wide on the Lehigh Valley, the width being governed by the width of right of way and the necessity for providing a drive behind the building. On the Lackawanna 24 ft. is the maximum width of building and other roads have similar rules. Frame buildings are set back 21 ft. 6 in. from the center of track on the Chicago, Rock Island & Pacific, and brick buildings 30 ft. to 36 ft., while on the Lackawanna 16 ft. platforms have been built, but a greater width is preferred. Where possible, room is provided by this road for flower beds or shrubbery between the station and the

tracks. The New York Central usually allows 27 ft. between the building and the center of track, using a canopy over the platform at important stations.

For small stations handling passenger traffic only, the American Railway Engineering Association Manual recommends the following ratios of floor area in the various rooms. General waiting room, 41 per cent; baggage and express room, 26 per cent; ticket office, 15 per cent; women's room, 10 per cent, and toilets, 8 per cent. Typical minimum waiting room sizes are 12 ft. by 20 ft. for the smallest type of station on the Lehigh Valley and 22 ft. by 32 ft. for a brick station on the Rock Island. The smallest ticket offices used vary from 10 ft. by 14 ft. on the Burlington and 8 ft. by 20 ft. on the Lehigh Valley, to 12 ft. by 16 ft. on the New York Central and the Pennsylvania. A preferred size on several roads is 18 ft. by 18 ft., or 18 ft. by 22 ft. The minimum sizes hardly provide room for the telegraph desk, ticket case, tariff file, letter press, etc., which an agent at such a station requires.

At combination stations, the Lackawanna usually has an elevated platform outside the building for handling freight to cars on the siding. The New York Central frequently provides separate baggage and express rooms, and when a single room serves for both, an end door is preferred to prevent the baggage and empty trucks from accumulating on the platform. A raised platform is provided within and without the building and a platform or beam scale may be installed. In many places a partition in the baggage room separates a small space for valuables or for checking parcels. On the Pennsylvania and the Lehigh Valley, the entrance to the men's toilet is from the outside of the building in order to keep some travel out of the waiting room. On the other hand, the New York Central, the Lackawanna, the Rock Island, the Santa Fe and the Burlington, arrange toilets so that both will open inside the buildings to prevent many loafers from using them so readily. The New York Central usually provides for a vestibule between each toilet room and the waiting room if no smoking or retiring rooms are included and on most roads an effort is made to locate the doors out of the line of vision.

#### WALLS AND ROOFS

The use of frame structures, formerly quite common, is being more and more restricted to new towns, temporary quarters, and permanent buildings only in the smallest villages and towns. The Lehigh Valley has not built a frame station since 1906, and the



**A Brick Station on the Burlington with Long Canopies at Either End**

Lackawanna does not use frame for any permanent construction in such buildings. The New York Central has recently built a frame combination freight and passenger station costing \$16,000, but the more ordinary buildings of this type cost \$5,000 to \$6,000. This road occasionally uses broad clapboards on its stations, but it is expected to limit the use of frame construction in the future to the canopies between the buildings and the track. The Rock Island builds 80 standard types of frame stations, the maximum size being 24 ft. by 104 ft., costing about \$3,500. The Santa Fe builds small frame stations 16 ft. by 40 ft., to 24 ft. by 65 ft. and 24 ft. by 80 ft., costing about \$1,200, \$2,200 and \$3,000, respectively. These structures are located on new lines and they usually re-

main for their natural life, although if the town develops a better station is provided. Frame stations are very seldom built for replacing existing structures. The Burlington builds a number of standard frame combination stations from 18 ft. by 38 ft., up to 24 ft. by 82 ft., costing from \$1,500 to \$2,950, or \$2.20 and \$1.50 per sq. ft. of floor area respectively.

The most usual wall construction for permanent stations of medium sizes is of brick or stucco, although concrete, brick veneer, terra cotta and natural stone, are all used to a limited extent. Brick stations are built by most roads at a cost of \$3 to \$5 per sq. ft. in sizes from 1,000 to 3,000 sq. ft., and are almost universally satisfactory. An impervious vitrified brick is frequently preferred, although some of the rough textile product is coming into use. The dark colors are ordinarily selected with a trimming of natural stone, terra cotta or concrete. The Lackawanna has tried a construction of two 4-in. brick walls with a 2-in. air space between them. In this connection, however, the insulation of the walls is generally considered relatively unimportant for the heating must be proportioned for an excessive window and door area.

Stucco has been widely used and in most cases has given satisfaction, particularly for the upper portion of the buildings. The objection to stucco below the window sills is that it is easily damaged by trucks, wagons, etc. The Lehigh Valley also finds difficulty in the streaking and discoloring of the stucco. On this road a building with hollow tile walls stuccoed costs from \$3.35 to \$4 per sq. ft. in sizes from 1,000



**A Brick and Stone Suburban Station on the Burlington Which Is Showing a Long Life and Low Maintenance Cost**

to 2,000 sq. ft. The New York Central does not use stucco below the window course but finds it satisfactory above that level either on frame or hollow tile construction, particularly when the lower part is of brick. The former is of course cheaper. The Lackawanna has used stucco over tile walls but has eliminated this type of construction on the basis of maintenance and appearance. The Pennsylvania frequently uses brick with a stuccoed surface, finding it little more expensive than tile. The Rock Island has built a number of tile and stucco buildings with brick below the windows at about the same cost as an all-brick station. The Santa Fe uses a stuccoed wall down to the foundation, placing guards where necessary to prevent trucks from damaging the surface. These buildings cost about \$3.50 per sq. ft. The Burlington builds a 24-ft. by 82-ft. station with frame walls, stuccoed, at a cost of about \$3,000 not including heating, lighting or fixtures, and a similar building with tile walls is estimated to cost about \$4,000. This road has successfully stuccoed one old frame station.

The Lackawanna uses some concrete buildings, and the New York Central has used concrete up to the window sill course, the cost usually being about the same as for brick. On the latter road the surface is pebbled, brushed or rubbed and the corners chamfered or rounded. In some cases a special face mixture may be poured and brushed out after the forms are

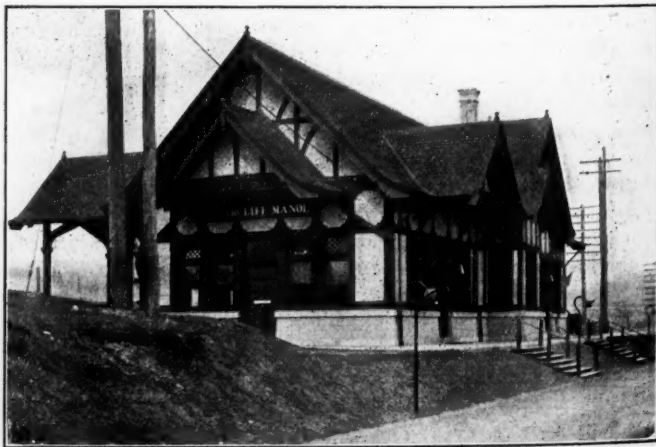
removed. The Lackawanna prefers a bush-hammered or bull-pointed surface. In addition to the cost, the chief objections to concrete for station buildings are the difficulty of accurately lining thin, high walls and the extra care required to secure a pleasing appearance of the surface. Brick veneered walls have been used to a limited degree. The Lackawanna places the brick facing on a tile wall and the Burlington finds the average cost for a 24 ft. by 82 ft. combination building without fixtures to be about \$4,000. A special type of building used by the Lackawanna in one case is the cream mat glazed terra cotta station shown in one of the accompanying illustrations. Natural stone is ordinarily used only where it can be secured economically near the site and the cost of course varies widely with local conditions.

The very large majority of small stations have a pitched



**A New York Central Station with Concrete Base Course and Wooden Clapboards Above**

roof with wide overhanging eaves. Plain roof lines are much to be preferred in reducing the maintenance on the building but for architectural effects gables and broken lines are frequently introduced. The most widely used and most satisfactory roofing materials for stations of medium size are tile and slate. The A. R. E. A. Manual recommends these materials for slopes of 6 in. per foot or over and ready or prepared roofing for very small or temporary buildings. The difference in quality between



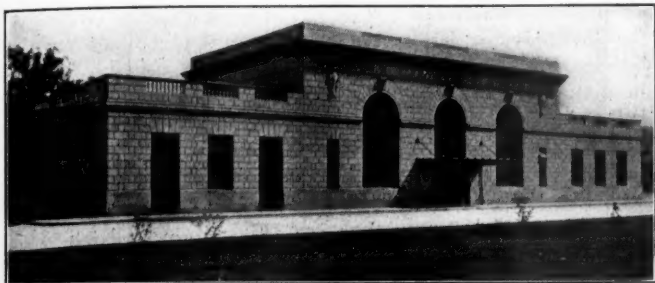
**A Concrete and Stucco Building on the New York Central**

various grades of slate and tile makes it difficult to compare accurately either their costs or serviceability. The best grade of slate when properly specified is considered expensive by some roads but its service is not questioned. The principal objection to the average slate roof is that it breaks easily from jars and some roads, as the Lackawanna, limit its use to cheaper stations. A good grade of impervious tile is reported by several roads to cost little more than the average slate and when properly laid on a waterproof paper, gives very good satisfaction. In laying tar paper roofs the Lehigh Valley has



found it necessary to use half round or oval molding over the laps to prevent wrinkling. Gravel and composition roofs, tar paper and asbestos shingles, metal and tin are all used to a limited extent on various roads. Under certain local conditions, all of these materials have advantages.

Opinion is divided as to the best type of gutter, the Pennsylvania favoring a standing gutter while the Rock Island, Lehigh Valley, the New York Central and other roads prefer a hanging gutter. The hanging gutter is usually considered to be easier to repair, the Rock Island using a sheet lead flashing under the tiles to allow repairs to be made without damage to the roof. Gutters and flashings are usually of copper, gal-



A Glazed Terra Cotta Station on the Lackawanna

vanized iron or a pure ingot iron, while gutters of wood are also frequently used.

#### INTERIOR WALLS AND FLOORS.

Partitions in small stations are usually built of brick, hollow tile or timber studs, the latter being the least desirable but also the least expensive. The lower portions of the walls in the public rooms are commonly wainscoted to a height varying from 5 to 9 ft. Wood is used for this purpose to some extent on the New York Central, the Lackawanna and the Buffalo, Rochester & Pittsburgh. The Lehigh Valley and the Lackawanna

pine, fir or oak, depending on the grade of the station. Plaster or wall board has been used to a limited extent on a number of roads and has been found very satisfactory by some. The Lehigh Valley has found that the board must be well seasoned, for if it is placed when green, it pulls away from the nails. The New York Central has used this wall finish in some temporary stations and in one or two small permanent buildings. This road prefers the imitation wood finish. On the Santa Fe some wall board has been used in localities where water is very scarce, rendering it difficult to make plaster. Pressed brick facing has been used in the public rooms in a few cases on the New York Central and the Lackawanna and a number of roads have faced the baggage and freight rooms with brick. Glazed tile are common in toilet rooms and the Buffalo, Rochester & Pittsburgh has used some sheet steel for lining train order rooms.

Wooden floors that have been almost universally used in the past are still being installed to a large extent on many roads. The comb-grained yellow pine which has been generally favored for this use is becoming increasingly difficult to secure and Oregon fir is being used in its place by some companies. The Buffalo, Rochester & Pittsburgh has built a number of stations with a double floor, consisting of  $\frac{7}{8}$  in. tongue and grooved hemlock, laid diagonally on the joists with a layer of building paper separating it from the surface layer of  $\frac{7}{8}$  in. tongue and grooved comb-grained Georgia pine. Maple flooring is used on a number of roads in the ticket office and a plank flooring is frequently laid in the baggage, express and freight rooms. Wooden floors have the disadvantages that they are not sanitary or fireproof and under severe wear do not have a long life. Tile floors are preferred to wood on the Lehigh Valley, the New York Central and the Rock Island, although their cost is, of course, greater. Concrete has been satisfactorily used in many of the stations built by the Santa Fe and on the Burlington a reinforced concrete floor with a cement tile surface is generally provided. Granolithic and terrazzo floors have been used almost ex-



A Brick Station on the Lackawanna with Separate Waiting Rooms for Traffic on the Opposite Track

use tile extensively, and the Rock Island prefers an impervious brick. In dark rooms a light gray enameled brick is used and in light rooms a dark brick. This construction is found better and cheaper than a good paneled oak wainscot. The Burlington and the Lehigh Valley use some enameled brick. The Santa Fe in general prefers a chair rail to the wainscot.

The wall, or at least the portion above the wainscot, is almost universally plastered, metal lath being used exclusively or generally on most roads. The woodwork is ordinarily of

clusively by the Lackawanna and cork has been used by the New York Central in some ticket offices. Baggage rooms on the Rock Island are laid with a brick floor practically the same as the platforms.

#### HEATING, LIGHTING AND PLUMBING

All stations built in the northern and central portions of the country require some provision for heating. For the very cheapest buildings on the Lackawanna, New York Cen-

tral and many other roads, stoves are still used, although the Pennsylvania puts very few stoves in new buildings. The Buffalo, Rochester & Pittsburgh provides a coke-burning stove for the very small buildings. The Lehigh Valley has tried car heaters for some of its stations and also has two vapor systems in service. For stations of medium size, however, steam and hot water heating plants are the most usual. The Lehigh Valley, the New York Central, the Lackawanna and the Pennsylvania prefer steam in most cases and the Burlington, Rock Island, and the Santa Fe prefer hot water. The Rock Island uses steam on its northern lines and hot water on the southern lines because of the possibility of maintaining an even temperature with a hot water plant when only a small amount of heat is required. In general the first cost of a steam plant is less than that for a hot water heater, but the latter is cheaper to maintain and uses less fuel. A factor considered by some roads is the danger of an explosion in a steam boiler while the worst that can happen to a hot water plant is for one section to burst and flood the fire.

The heating plants are usually located in a basement if possible, although in some localities the height of the ground water will not permit an excavation to be made under the building. On most roads the basements are made only large enough for the furnace and for coal storage, although the

it is almost universally utilized, gas is piped to the station in many instances and in many of the smaller stations only oil lights are justified.

The provision of sanitary plumbing is also dependent to a certain degree on the ability of the roads to connect with water and sewer systems in the towns. It is almost a universal practice to provide such connections whenever possible and in many cases, particularly on eastern roads, cesspools and septic tanks are installed when the towns have no sewer systems. In the central and western states it is unusual to find a town in which a medium sized passenger station is justified which does not have a water and sewer system. The Lehigh Valley uses cesspools 6 to 8 ft. in diameter and 15 ft. deep or a rectangular box of brick, hollow tile or stone. On the Pennsylvania large double cesspools laid up dry are used. These are built of stone or brick and are usually 7 to 8 ft. in diameter and about 15 ft. deep.

Drinking fountains are frequently provided even in the small stations and there is an increasing tendency toward the use of sanitary or bubbling fountains. A number of roads, however do not consider the provision of drinking water important and if not convenient omit it. When ice is provided the better practice is to put the water through coils, around which the ice is packed.

#### PLATFORMS AND STATION GROUNDS

Station platforms on the Lehigh Valley and the Lackawanna are usually of concrete and on the Rock Island, the Buffalo, Rochester & Pittsburgh, the Santa Fe and the Burlington, of brick. The New York Central uses both concrete and brick, finding the latter better in northern climates where snow and ice collect. Brick platforms are usually laid either in the herringbone pattern or at right angles to the length of the platform. The former is considered to give a little better support for trucking, but requires cutting the bricks and using small pieces at the edges. Brick platforms are laid on sand or gravel fill or on a concrete base and are usually provided with a concrete curb. On the Burlington these curbs are built in a company plant and shipped to the site in the manufactured state. It has been found that in this way a curb fully as cheap as a creosoted timber can be provided. On the Santa Fe the concrete curbs have bricks on top.

One of the most marked advances in practice during recent years is indicated by the increased attention being paid to the appearance of station grounds. Many expensive and

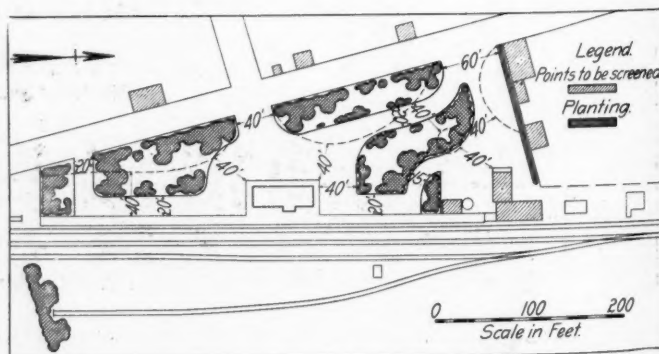


A Brick Station on the Buffalo, Rochester & Pittsburgh in a Small Rural Community

Pennsylvania usually excavates under the full building in order to make all pipes accessible without the use of tunnels or conduits. Several roads endeavor to locate the basement under the toilets so that the plumbing is accessible from below. The Rock Island provides a reinforced concrete floor in all basements. The alternate location for a heating plant is usually in the baggage room or freight room, where it is common to set the furnace in a shallow pit a few feet below the floor level. The Lehigh Valley lays pipe runs in vitrified clay conduit under the floor, arranged to pull the pipe out if necessary. On the Lackawanna short pipe runs are laid in conduit and long ones in a covered box in the floor. The Rock Island usually provides a tunnel for the pipes and on the Santa Fe and the Burlington the feed pipes of the hot water system are run overhead in the attic with the returns outside the building in conduit or in a tunnel under the floor.

In general, radiators are located along the wall, under the windows or near the doors. The New York Central avoids exposed radiators wherever possible, ordinarily placing them against the outside walls back of the seats. The obvious objection to an exposed radiator is that it soon becomes a litter box and a cuspidor. The Burlington does not favor the location of radiators under seats, as this practice prevents the rearrangement of seating facilities. In some cases attention must be paid to the location of radiation with reference to the coldest extremity of the building.

The provision for lighting stations depends largely on the system in use in the community. If electricity is available,



A Typical Layout of Drives and Shrubby at a Small Station on the Pennsylvania

well designed buildings have in past years been located among such squalid surroundings as to lose almost entirely their architectural value. This condition is fast being remedied, however, by the sodding of the station grounds, laying out walks and drives where the opportunity is presented and in many cases by planting trees or shrubs. The Pennsylvania has given special study to this work and has in its maintenance department an office which prepares landscape plans and supervises generally the use and care of all plants.



Trained men handle features not ordinarily given their due share of attention, such as the views to be had of railroad structures and the surrounding country from the approaches to the building, and from passing trains, and the use of every opportunity for artistic arrangements that do not conflict with the utilitarian objects of the station. General plans are drawn on a 40-ft. or 20-ft. scale to show all buildings and landscape features, trees, shrubs, etc., around the station and on this plan very careful location of each tree and shrub is possible. The accompanying drawing illustrates in dotted lines the way the drives at a small station would have been located had not the rearrangement shown in solid lines been suggested by those who appreciated the need to screen the very objectionable appearing buildings on adjoining property. A company nursery on this road furnishes most of the trees and shrubs and a gardener foreman with a small gang on each division tends to the planting, watering and other maintenance.

The Lackawanna also makes detailed plans of station grounds showing driveways, walks, shrubbery, etc., particularly for suburban stations. There is also an organization connected with the maintenance department to look after this class of work.

On the New York Central station grounds are always graded and vacant spaces sodded, any parking or decoration that may be desired being left to the superintendent and the station agent. On the Rock Island the division officers lay out drives and walks, shrubs, etc., and the local men maintain them, while on the Burlington the architect's office prepares the layout for station grounds and the division force takes care of the maintenance.

## INCOME FROM THE MAINTENANCE OF WAY DEPARTMENT

By "SUPERVISOR"

The maintenance of way department of any railroad organization is primarily a spending organization. Any income from this source is necessarily incidental, and in no way can it be regarded as a main function of the department to turn any considerable sums into the treasury. Admitting these premises, there still remains the fact that the maintenance organization can do something toward swelling the general income of the railroad. In times such as these, any addition, however small, to the net income, is extremely welcome to the management, and this article purposes to outline how one maintenance officer paid his annual salary back to his company several times over by devoting a little time and trouble to increasing the sales of scrap material to outside parties.

The territory in charge of this man is a single-track branch line running through a fertile farming country and serving two large and one small industrial towns, the seats of large iron and steel manufacturers. When the idea first presented itself the prospect seemed rather poor, for there was apparently little which the railroad man could offer for sale which would appeal to the public along his tracks. His main commodities were old rails, old ties and engine cinders, and his first duty was to go out and make a market for these goods. His first step was to call upon the purchasing agents of the various industries located along his tracks. He found that their purchases of scrap iron and steel were made in such lots and at such prices that they could best be handled by the purchasing agent of his own company. His offers of engine cinders for filling, etc., met with no response. His offers of old ties, however, were considered, and after consultations with furnace and mill superintendents he was able to place orders for several carloads of old ties at a price which netted his company a good profit over the cost of loading and hauling them to the point of delivery. These ties

are used by the furnace people for kindling, and gave such satisfaction to their purchasers that he was able to turn in over \$400 from this source for the year 1914, with the iron business at a low ebb.

When main or running-track rail renewals release rails in fairly good condition, but too light for further railroad use and not quite good enough for sale in the open market as relayers, the matter is taken up by personal calls upon superintendents, managers and owners of industrial tracks along the line, frequently with success. By quoting prices slightly lower than the current prices for relayers plus the freight on them, by being able to guarantee condition and by permitting inspection and rejection while the rail is being loaded, he has been able to sell several cars of light rail per year at prices from \$5 to \$8 per ton above their scrap sale value. Fittings are also sold at a large increase over their scrap prices. During 1914 about 95 tons of rail and \$160 worth of fittings were sold at prices averaging \$6 per ton above normal scrap values. Without personal effort to dispose of this stock it would have gone to the scrap pile.

By getting in touch with township road authorities another market was opened. Rails were sold for re-enforcing culverts and small bridges. After the free gift of enough engine cinders to surface several stretches of mud roads, a market developed for this class of material. Farmers and country merchants came to recognize that cinders were the best and cheapest material for private roads around their buildings and into their fields. Building contractors were next approached, generally with successful results. These men buy second-hand lumber, for which the railroad has no further need, rails for concrete work and large quantities of engine cinders for foundations, for paving construction and for filling. Between the road supervisors, the farmers and the contractors the sale of engine cinders now runs from 600 to over 1,000 cars per annum. This is a saving in two ways, as formerly a large amount of these cinders was unloaded on waste dumps at considerable expense for labor. The demand for these cinders now is frequently larger than the divisional supply.

From these various sales of materials at his disposal he was able to show an income averaging considerably over \$10,000 per year during 1913 and 1914, including in this sum only the difference between the scrap value of rails, etc., and the sums actually received for them, and making no account of the labor saved from wasting cinders. The cost of hauling to the consignees has also been omitted (all material was sold f. o. b. destination), but most of it would have had to be handled by trains under any circumstances. No small part of the credit for this showing is due to the railroad's purchasing agent, who set the prices at which this material should be sold, and who used every means in his power to assist the man on the ground and gave him every facility for quick and fair selling.

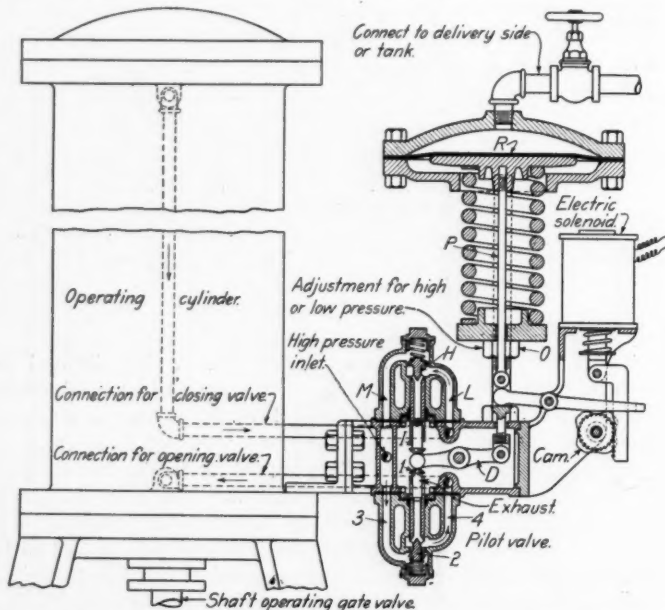
While the sum mentioned above as the annual turnover of profits is small in comparison with other sources of railroad income, yet it is new business. It has been developed from practically nothing, the selling expense is nil, and it shows that even the maintenance of way department can in its small way put something on the right side of the big ledger.

**NYASALAND RAILWAY OPENED FOR TRAFFIC.**—The extension of the railway running between Port Herald, in Nyasaland (the southern terminus of the Shire Highlands Railway), and Chindio (a point on the northern bank of the Zambesi) was opened for traffic on April 1. This line forms complete railway communication between the Zambesi and Blantyre (the capital of British Nyasaland). It is 61 miles in length and crosses a tributary of the Zambesi by a steel bridge of 38 spans, over a third of a mile in length. The chief importance of the line is that it facilitates transport between Nyasaland and a navigable point on the Zambesi. At Port Herald the river is only navigable for a few months in the year, while at Chindio boats can run all the year round.

## AUTOMATIC CONTROL FOR A GATE VALVE

An application of the Golden-Anderson automatic control device to a hydraulic gate valve for automatically maintaining the water level in tanks, standpipes or reservoirs, has recently been developed by the Golden-Anderson Valve Specialty Company, Pittsburgh, Pa. The latest form of this valve for controlling a globe valve was illustrated in the *Railway Age Gazette* of March 19, 1914. In the design illustrated herewith the gate valve is opened and closed by an operating cylinder, the piston of which is actuated by hydraulic pressure through pipe connections to the pilot valve of the control device.

When the valve is open and water is flowing freely to the tank or reservoir the parts of the control device are in the position shown in the sketch. This condition exists as long as the pressure in the tank or on the outlet side of the valve, which is transmitted to the upper side of the diaphragm "R" through a pipe connection, is less than that for which the heavy spiral spring has been adjusted by the nut "O," for under this condition the spindle "P" is forced upward by the spring and the arm "D" closes the exhaust valve 1 and opens the high-pressure valve 2, at the same time allowing the exhaust valve "I" to open and the high-pressure valve "H" to close. The full pressure in the pipe line on the inlet side of the valve is transmitted to the pilot valve through a pipe connection to the high-pressure inlet, and thence



Improved Arrangement of Control Valve for Use with a Gate Valve

through the ports 3 and 4, and the pipe leading to the lower side of the operating cylinder. The piston in the cylinder is allowed to move upward under this pressure as the water above it is exhausted through the pipe to the pilot valve and the port "L" to the atmosphere.

When the pressure in the tank or on the outlet side of the valve has exceeded the pressure maintained by the coil spring, the spindle "P" is forced downward by the diaphragm "R" operating the arm "D" which then closes the exhaust valve "I," opens the high-pressure valve "H" and permits the exhaust valve 1 to open and high-pressure valve 2 to close. The pressure from the inlet side of the valve is then transmitted through ports "M" and "L" and the pipe connection to the upper side of the piston in the operating cylinder. As the water underneath the piston is allowed to exhaust through port 4 to the atmosphere, the valve is closed smoothly and positively.

An electric solenoid attachment similar to that used on previous forms of this device can be attached to enable the valve to be opened or closed electrically from any number of distant points. As the electric current is only applied to the solenoid for

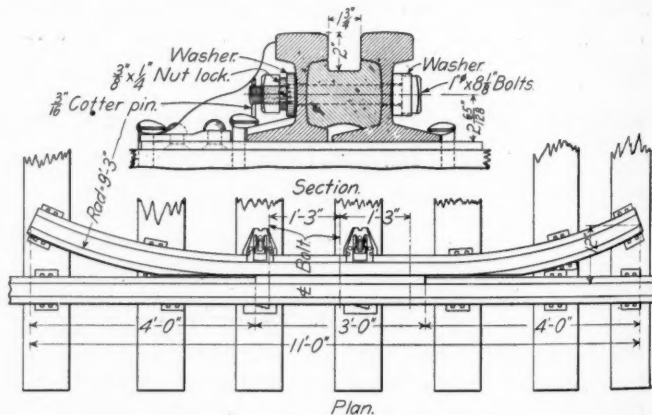
a few seconds in the operation of the valve there is no waste of current. In a similar manner the addition of an extra diaphragm attachment in place of the electric solenoid allows the valve to be hydraulically closed at any time by putting increased pressure on the main. This diaphragm can be adjusted to a few pounds above the normal supply, this increased pressure operating the pilot valve as described above.

It is also possible by connecting the inlet pressure pipe both to the pilot valve and the top of the diaphragm to operate the control valve in both directions, allowing water to flow into the tank or reservoir and to return through the same pipe whenever the pressure is less on the inlet side than in the tank.

## THE B. R. & P. STANDARD GUARD RAIL

One of the most difficult of the smaller details of maintenance of way work with which the track man has to contend is that of guard rail maintenance. In common with other roads, the Buffalo, Rochester & Pittsburgh has experimented with guard rails of different lengths supported by numerous types of guard rail braces, clamps and fasteners, as a result of which it has adopted as standard the design shown in the accompanying drawing.

The standard guard rail for both main and turnout tracks is 11 ft. long with a 3-ft. cast filler block bolted through both the guard and main rails with three 1-in. bolts spaced 15 in. apart. Both the guard and main rails are full tie plated with standard plates. The guard rail is straight for a distance of 3 ft. in the



B. R. & P. Standard Guard Rail

center, beyond which it is curved to a radius of 9 ft. 3 in. at each end, giving a clear distance of 12 in. between gage lines at the ends. The center of the guard rail is placed 6 in. ahead of the point of the frog, leaving 12 in. of straight flangeway back of this point. Two dimensions of cast filler blocks are used, that for the main tracks providing a 1 3/4 in. flangeway, while that on the turnout side of the frog provides for a 2-in. flangeway to correspond with the standard practice of widening the gage 1/4 in. through the turnout. The 1-in. bolts are provided with a washer on the head end and a washer, a 3/8-in. nut lock and a 3/16-in. cotter pin on the opposite end. The fillers are made of ordinary cast iron and can be cast in any foundry while the guard rails are sheared and drilled complete in the company's shops.

Approximately 4,500 of these guard rails are now in use on this line. Loose guard rails are practically unknown, and the wear on switch ties and frog points as well as the element of danger have been very largely eliminated. In addition to the guard rail remaining in its proper position, the labor of keeping the flangeway free from ice in winter is eliminated since it is only necessary to drop a little salt in the flangeway. When a section foreman orders a guard rail it is furnished to him complete with all accessories, including the rail, bolts, washers, filler and guard rail fasteners complete.



# Renewal of Ties—Inspection, Marking and Records

## Methods Being Used to Insure Best Results in Removal of Old and Distribution and Use of New Ties

The latest official statistics show that the railroads spend annually about \$55,000,000 for the ties used to replace those removed from the track on account of wear, decay, accidents, etc. This figure, which does not include the cost of labor for distributing the new ties, placing them in the track and disposing of the old ones, together requiring so large a part of the trackmen's time during the spring and summer, is about 15 per cent of the total cost of maintenance of way and structures and 3 per cent of all operating expenses. It is obvious then that particular care is justified to insure the lowest percentage of renewals consistent with proper maintenance standards and important as this subject is at present, it is becoming increasingly so on account of the rapidly increasing cost of ties.

Theoretically, to attain the maximum economy every tie should remain in the track until it reaches the point in its deterioration when it will no longer support the rails with the proper factor of safety and should then be removed immediately. Practically, since ties are renewed once a year it is the general rule to remove all that will not safely carry the loads for another year, and on account of the disadvantages resulting from tearing up the road-bed as is necessary to a certain extent in tie renewal, it is practical economy to remove ties with even a greater life than this during general surfacing, reballasting or rail renewal.

Some roads have tried to assign a reasonable number of ties to each section and leave it to the foremen to use them to best advantage, but the imperfections of this scheme are obvious. It is almost universal therefore to base the requisition for ties on an inspection of the track prior to the season of renewal, although the methods of making this inspection, of checking the reports and of supervising the work of placing the new ties in the track vary widely. These differences as they exist on 16 typical important roads are discussed in the following paragraphs.

### INSPECTION AND MARKING

The inspection upon which the requisition and allotment of new ties is made is left to the section foremen on the Central Railroad of New Jersey with very satisfactory results. The supervisors are constantly in touch with the foremen, walking each section during the year and familiarizing themselves with the details. Each foreman is allowed to ask for as many ties as he thinks he will require. This data is then checked up by the supervisors, who have acquired during the course of the year an approximate idea of what the needs of each section will be. The requirements are then forwarded to the engineers maintenance of way, who tabulate the data and make requisition for the necessary ties. After renewals have started, the supervisors and assistant supervisors examine all ties removed very carefully, and if a foreman is found to be removing too many ties, or leaving poor ties in the track, his attention is drawn forcibly to the fact. The engineers maintenance of way as well as the superintendents also inspect ties that are removed at frequent and unexpected intervals in their trips over the line. Any ties removed from the track that are found to have any additional life are sorted and picked up by the work train and used in siding repairs or construction, being spotted in with good or new ties. Under this system the situation has gradually improved until it is scarcely ever necessary to draw a foreman's attention to any misjudgment, and much better results are being secured than by methods previously employed. The objection to leaving the selection of ties to be removed from the track entirely to the section foreman, which is advanced by some maintenance men, is that there is too great a tendency under this method to praise the man who puts in the most ties per day per man, resulting in the removal of some ties from which additional life could be secured.

Several roads have found it advantageous to combine the detailed inspection of the foremen with check inspections by supervisors, roadmasters, engineers or superintendents. On the Boston & Albany the foreman's statement is checked by the supervisor or his assistant and is then sent to the division engineer for approval. On the Pennsylvania the practice is similar except that the division engineer, usually accompanied by the supervisor, also makes frequent independent inspections to see that the proposed renewals are proper and economical. In addition, there are men assigned to special duty both on the division and in the office of the engineer maintenance of way, who regularly follow up tie renewals, making an inspection both of the ties removed from the track and those left in. These men submit reports on what they find and any cases of bad judgment are taken up through the regular channels. During the time that this practice has been followed, covering the last six or seven years, there has rarely been any cause for criticism.

The reports of the Northern Pacific section foremen are checked by the roadmasters walking over a part of each section, and in addition the division superintendent goes over at least three sections on each roadmaster's district accompanied by the roadmaster on a hand car or on foot to verify the tie requirements. The Illinois Central requires the supervisors, after receiving the foremen's reports, to make an independent inspection and then forward the foremen's reports with their recommendations. The roadmasters, on receipt of the supervisors reports, walk over selected miles with the division superintendents to check the judgment of their men.

Some roads place the responsibility for the tie inspection entirely on the supervisors or roadmasters. Such roads include the Atchison, Topeka & Santa Fe, the Norfolk & Western and the New York Central. On the Baltimore & Ohio all tie inspections are now being made by the supervisors and a general tie inspector for the system checks up these reports. This method has been found better than a previous one in which tie inspectors alone handled this work. Other roads, including the Chicago & North Western, the New York, New Haven & Hartford, the Philadelphia & Reading, the St. Louis & San Francisco, and the Union Pacific, require the roadmaster or supervisor and the section foremen to go over the line together for the inspection of ties to be renewed, thus combining the broader experience and better judgment of the superior officer with the detailed knowledge of local conditions possessed by the foreman.

On two of the roads considered, the tie inspector is used with satisfaction. The Queen & Crescent inspectors are selected by the roadmasters and report to them. They are accompanied in making their trip over the line by each supervisor while working on his district. The Buffalo, Rochester & Pittsburgh selects the most intelligent extra gang foremen for tie inspectors, making them report to the division engineers. They are accompanied by the section foremen in going over the line. The roadmasters and foremen are not relieved of responsibility for the safety of their track on this road and are given a proper voice in the matter of tie renewal. Objections are advanced to the use of tie inspectors by some roads, one of these having found that the best section foremen on the road when made tie inspectors could not spot all of the bad ties and would spot some good ones so that the net results were less satisfactory than when the work was handled by men familiar with the local conditions.

The time of making tie inspections is also extremely variable, so that considering April 1 as the beginning of the tie renewal season, the inspection is begun on some roads as much as nine months before that date and is not finished on others until three months after it. The Boston & Albany and the New York Central are among those that begin early, the former making its

inspection during July and August, and the latter usually finishing it before October 1. The Union Pacific, the Chicago & North Western, the Pennsylvania, the Central Railroad of New Jersey, the St. Louis & San Francisco, and the New Haven, require the inspection to be made during the fall, and the Queen & Crescent specifies December. On the Baltimore & Ohio the work is begun as soon as possible after January 1 and is completed before July 1. The months of April and May are designated for tie inspection on the Illinois Central, and on the New Haven and the Buffalo, Rochester & Pittsburgh, the work is handled during the spring, beginning on the latter road as soon as the frost is out of the ground.

The points to be considered in an inspection of ties in the track may be left entirely to the judgment of the inspector or be covered more or less completely by written instructions, depending on the practice of the individual roads. When such instructions are brief they ordinarily mention a close examination including the ties on each side of the one under consideration, the local roadbed conditions, the location, whether in curve or tangent, the amount and character of the traffic, the visible rot or crack, and a test with an adze or other suitable tool to determine interior soundness. A very complete set of instructions is issued to the tie inspectors on the Buffalo, Rochester & Pittsburgh, from which the following abstract is taken:

There are two standards for making renewals in main track; first, where the track is not to be disturbed and the ties will therefore be dug in and, second, where the track is to be raised off of the old bed allowing the ties to be placed during the raise. Under the first condition ties must be inspected by driving a pick in each side adjacent to the rail seat near both the bottom and the top faces below the sap line. The pick must be driven into the ties toward the center and be drawn with as little prying as possible. The ties must not be tested on the top except in an endeavor to find decay around the tie plate and spike, and in such tests the ties must not be mutilated more than absolutely necessary. To test the tie for strength, one end of a pick should be inserted under the end of the tie and the pick used as a lever. If the tie is broken under the rail seat this will usually determine it. If two ties with only one year's safe service are adjacent, one must be removed. In a group of ties, all of which have only

and used for side track renewals if the timber is sound. On tangents where a good tie is cut down  $\frac{3}{4}$  in. by rail wear or adzing it should be protected with tie plates against further cutting. Careful attention must be given to the inspection of red oak and pin oak ties, as this timber usually rots from the center, leaving a hard shell which can be detected only by careful inspection. In track that is subject to heaving and where shimming is necessary, care must be taken to insure enough good ties

FORM 1598																	
BUFFALO, ROCHESTER & PITTSBURGH RY.																	
ENGINEERING DEPARTMENT																	
FOREMAN'S DAILY REPORT OF TIES PUT IN TRACK																	
Date _____ 191__		Division _____		Section _____		Mile Post _____		To Mile Post _____									
LOCATION	T	E	RO	BO	PO	M	B	Br	Cy	G	C	H	P	REMARKS			
North Bound Track																	
South Bound Track																	
Single Main Track																	
Side Track No.																	
Side Track No.																	
Side Track No.																	
No. 7 Switch Set																	
No. 7 Switch Set																	
No. 8 Switch Set																	
No. 8 Switch Set																	
No. 9 Switch Set																	
No. 9 Switch Set																	
No. 12 Switch Set																	
No. 12 Switch Set																	
No. 7 Xover Set																	
No. 9 Xover Set																	
No. 12 Xover Set																	
Correct _____														Signature _____			
ROADMASTER _____														SEC. FOREMAN _____			
INSTRUCTIONS—Section Foreman must fill out one of these reports covering ties put in main tracks and sidings for each mile, and mail to Roadmaster at close of each day. Note opposite each switch and crossover set, under proper heading, the number of pieces of each kind of timber, and show station and side track number where located. Show station where each side track is located in remarks column opposite.																	

#### The B. R. & P. Foreman's Report of Ties Put in Track

for spiking and bracing and special attention must be given to the inspection of ties through road crossings, station platforms and other places where they are covered and likely to be overlooked by the section men.

The second condition governing the marking of ties for renewal arises from the policy of the company to resurface out of face a part of the main line on each section each year in addition to the

FORM 1598																	
BUFFALO, ROCHESTER & PITTSBURGH RAILWAY																	
ENGINEERING DEPARTMENT																	
FOREMAN'S DAILY REPORT OF TREATED TIES TAKEN OUT OF TRACK																	
Date _____ 191__		Division _____		Section _____		Between Mile Post _____ and Mile Post _____											
LOCATION	T	E	RO	BO	PO	M	B	Br	Cy	G	C	H	P	REMARKS			
North Bound Track																	
South Bound Track																	
No. 12 Xover Set																	
Correct _____														Signature _____			
ROADMASTER _____														SECTION FOREMAN _____			
INSTRUCTIONS—Section Foreman must fill out one of these reports covering treated ties taken out of main tracks and sidings for each mile, and mail to Roadmaster at close of each day. Show under proper heading all ties having corresponding letter on nail, and show those having same date on dating nail on the same line and give date. In case number on dating nail cannot be read, give date as shown by position of nail in tie in accordance with standard instructions. Note opposite each switch and crossover set, under proper heading, the number of pieces of each kind of timber, and show station and side track number where located. Show station where side track is located in remarks column opposite.																	

#### A Report Covering Treated Ties Taken Out of Track

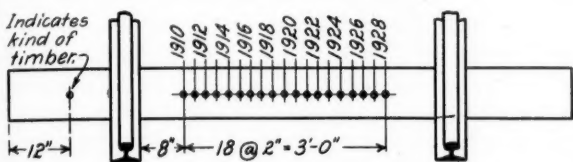
one year's safe service, enough must be renewed to leave each doubtful tie with one good neighbor. Sap rot alone is not sufficient to condemn a tie. A tie cut down by rail wear should not be renewed unless the rail has cut into the face more than  $\frac{3}{4}$  in. This applies to ties on tangent, as all curves are tie plated. On curves when by being adzed repeatedly for rail renewal, a tie is cut down sufficiently to weaken it, it should be removed

reballasting of track when new rail is laid. In such cases it is the intention to make sufficient renewals to last two or three years without having to disturb the track during that time. Under this condition the inspectors test the ties as previously described, removing all that will not last more than two years. Where new steel is laid, no bad ties must be left under the joints. In making renewals in this case, some fairly good ties may be



taken out, in which case they should be carefully sorted and piled, to be picked up and distributed for side track renewals. A lower standard of inspection is used for mine tracks and side tracks, and especially for standing tracks in yards where no ties are taken out until their safe service is passed. In passing tracks care should be used to see that all ties around turnout curves are in good condition.

Although a large majority of the roads considered require the officer making the first inspection to mark each tie in some distinctive manner for future identification, several roads, including the Pennsylvania, the Union Pacific and the Central Railroad of New Jersey use no system of marking. The two commonly recognized methods of designating ties for renewal are by cutting with an adze or axe, and by painting a line on the web or base of the rail directly over the tie. Various forms of cutting are in use, such as chipping off one corner, and notching the side or top of the tie, while on the Northern Pacific two gashes about 3 in. apart are cut on the side near the end. The Buffalo,



Method Used on the B. R. & P. for Marking the Kind of Timber and the Year Ties Are Put in Track

Rochester & Pittsburgh, the Queen & Crescent, the Baltimore & Ohio, and the Atchison, Topeka & Santa Fe use paint.

#### RENEWALS AND RECORDS

On the Union Pacific it is the practice to distribute enough ties before March 1 to care for the renewals on each section up to June 30, the remainder being piled in yards and distributed after July 1, so as not to interfere with the mowing of the right of way. The roadmaster selects the locations at which the renewals are to be made each month and inspects the ties after renewals. On the Pennsylvania the foreman "blazes" or marks with kiel the ties that are to come out just previous to their renewal. The


the holes whenever a spike is drawn. To reduce the tendency to decay around the holes these plugs are treated.

On the Queen & Crescent the foreman, during the renewal of ties, examines carefully each tie spotted for renewal by the inspector and leaves in the track any that he thinks will last another year. He also reports any ties not spotted that he thinks should be removed, giving their location, but waiting for authority from the roadmaster before taking them out of the track. On the Buffalo, Rochester & Pittsburgh the foremen renew only the ties spotted by the inspectors on track that is not to be raised. In case they think additional ties should be removed they report to the roadmaster, who has the ties reinspected. In track that is being raised the foremen are allowed to remove unmarked ties which should come out, placing a cross on them for special inspection later. Such ties are used again if possible. The inspectors on this road are instructed to watch carefully the practice of section forces in renewing ties and to report any improper practice. It is customary on most roads to pile and burn the ties removed after proper inspection to secure ties that may have additional life in side tracks or yards. Special precautions are necessary in burning ties to prevent fire damage to the telegraph line, right of way fence and adjacent property.

The number and kind of records of tie renewals kept for future reference differ considerably on the roads considered. These permanent records are kept by various officers ranging from the division engineer to the general manager and the records may be intended simply for a check of the actual renewals with the requisition or for comparisons of the renewals on each mile for a period of years to make possible close supervision. On the Union Pacific each roadmaster is given an allowance showing the number of ties that can be used each month to avoid getting the expense for all renewals in one month. To supplement the record turned in by the tie inspector, the foremen on the Queen & Crescent are required to make a monthly report to the roadmaster showing the number of ties on each mile spotted for renewal, but found good for another year, and also the number not spotted but removed, with the cause of their removal. The Boston & Albany keeps a record by weeks of all ties taken out of track on the forms reproduced herewith.

The Buffalo, Rochester & Pittsburgh requires a daily report

M. W. 13.



## BOSTON & ALBANY RAILROAD

(N. Y. C. & H. R. R. Co., Lessee)

3m-12-11. H.

Section No. \_\_\_\_\_

**CROSS TIES TAKEN OUT OF TRACK**

Week \_\_\_\_\_ during Month ending \_\_\_\_\_ 191\_\_\_\_

Section Foremen shall report all Cross Ties taken out of Track, not including Bridge or Switch Ties, as per Blank Form below. Great care should be taken to give all information called for. In column "Kind of Treatment" the following letters should be used instead of writing words in full:— Untreated, U; Treated, Zinc Chloride Process, Z Cl; Creosote, C; Ruepping, RP.

**SECTION FOREMAN'S REPORT.**

Sub-Division No. \_\_\_\_\_

MAIN TRACKS								SIDE TRACKS									
Number Removed	Year Put in as Marked	Tie Placed or Not	KIND OF		CAUSE OF REMOVAL				Number Removed	Year Put in as Marked	Tie Placed or Not	KIND OF		CAUSE OF REMOVAL			
			Timber	Treatment	Decayed	Rail Cut	Spike Killed	Other Causes				Timber	Treatment	Decayed	Rail Cut	Spike Killed	Other Causes

Approved, \_\_\_\_\_

Supervisor.

Signed, \_\_\_\_\_

Section Foreman.

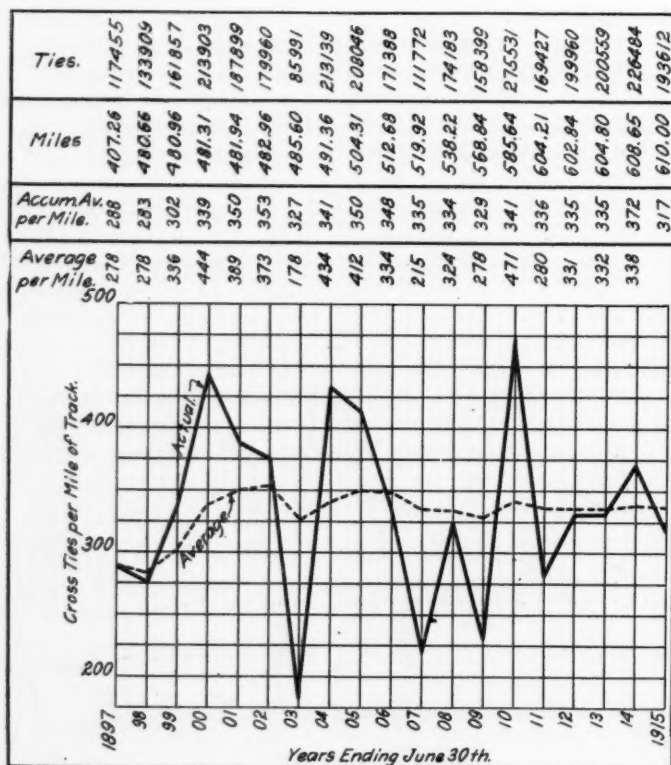
The Boston & Albany Form for Reporting Cross Ties Taken Out of Track

ties removed are held for inspection and the good ones returned to side tracks, the rest being burned or destroyed. On the New York Central the foremen are instructed to avoid as far as possible the renewal of ties to face and they are cautioned particularly against damaging the ties by picks or by hammering them in spacing. Tie tongs are furnished on all sections where treated ties are used and tie plugs are required to be driven in

from foremen showing ties put in the track and treated ties removed. This information furnished on the blanks reproduced herewith, is tabulated in the office of the chief engineer in book form by weeks. The treated ties on this road are marked at the treating plant by a galvanized nail bearing letters indicating the kind of timber which are driven in the upper face of the tie 12 in. from one end. When the ties are placed in the track a

similar nail bearing the date is placed in the upper face of the tie between the rails, the position along the tie also being varied by an increment of 2 in. for each year. On the Baltimore & Ohio the record of ties marked for renewal is transferred in the office of the division engineer to forms covering main and side track, tie inspection and renewals, blue prints of which are sent to the engineer maintenance of way through the office of the district engineer maintenance of way immediately upon the completion of the inspection for the division. During the season of renewals the foremen report monthly on the ties removed from track, this report accompanying and checking the material report. This information is also entered on the forms mentioned above, furnishing a complete record of the renewals of the year by miles.

On the Illinois Central a record is kept in the office of the chief engineer of all ties used each year for construction and maintenance and also a special graphical record of the renewals in main track. Each district has a separate chart, and these are bound in book form. A book covering the entire system is kept in the office of the chief engineer and one covering each division



A Chart Kept by the Illinois Central, Showing the Actual Annual Consumption and the Accumulative Average Annual Consumption of Ties per Mile of Main Track on One Division

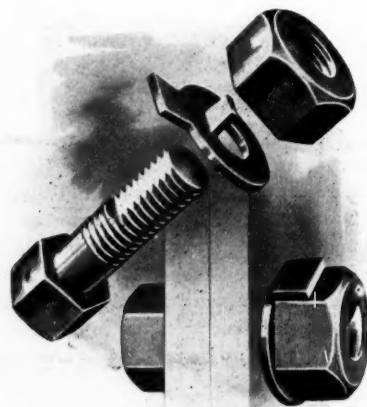
is furnished to the division superintendent. As soon as the recommendations for tie renewals are made they are plotted on the chart and when any important difference from the accumulative average is shown an investigation is immediately made by an assistant engineer from the office of the engineer maintenance of way or by an old roadmaster selected by the engineer maintenance of way on account of his previous good record in tie renewals. The curves shown herewith illustrate the manner of keeping this record for a typical division.

In determining the average number of ties per mile used in renewals each year, a correction is applied in cases where new lines have been constructed, so that the average derived furnishes a comparison of the renewals on all districts regardless of the date the line was constructed. The mileage of new track is therefore added not in its entirety the year the line is built but in sections during a period of nine years. The amount added

each year is proportionate to the estimated tie renewals required for that year. The first addition is made during the third year, amounting to 2 per cent, the remainder being added as follows: fourth year 3 per cent, fifth year 5 per cent, sixth year 5 per cent, seventh year 25 per cent, eighth year 50 per cent, and ninth, 10 per cent. On account of the increased average life of ties resulting from the use of tie plates and preservative treatment these percentages will be revised in the near future. Two averages are shown on the chart, the solid line representing the average ties per mile used in renewals in the years shown, and the dotted line the accumulative average per mile used in renewals since 1897, the year in which the chart begins. The actual number of ties used each year is shown at the top of the chart and the scale of miles is corrected, not actual.

## A COMBINED NUT LOCK AND WASHER

The nut lock manufactured by the Positive Nut Lock & Tie Company, Grand Rapids, Mich., has been in satisfactory service on 150 track bolts in the crossing of the Pere Marquette and the Michigan Central in Grand Rapids, Mich., since May, 1913. Other tests have also been made to demonstrate its adaptability to cars, locomotives, and various other machines. The device consists of a soft steel washer with a lug extending on one side and a wedge shaped tongue projecting at right angles from the edge of the hole through which the bolt passes. One side of



The Goble Nut Lock

the bolt is cut off at the end for the distance it is desired to screw down the nut. The tongue on the washer rests against this flat side of the bolt so that when the nut is turned on it will cut a thread on the surface of the tongue, thus forming a threaded wedge. When the nut is turned into the desired position, a lug on the outer edge of the washer is bent down to engage the side of the nut so that the bolt, nut and washer are all bound firmly together.

The advantages claimed for this device are that it does not injure the threads of the nut, it is adjustable and can be locked in any position lengthwise on the bolt and can be unlocked, removed and relocked as often as desired without injury. Old bolts in good condition can be slabbed and equipped with these nut locks, although the company is prepared to furnish new bolts already slabbed. With the use of such a device a better grade of steel than is commonly employed is recommended for bolts subject to particularly severe strain since the nut lock prevents the nut from giving, resulting in a lengthening of the bolts unless the material is designed to withstand this strain.

SIGNALS IN THE UNITED KINGDOM.—An English signaling authority has recently estimated that there are approximately 310,000 switch and signal levers on the railroads of the United Kingdom, and the approximate number of signals is 171,000.



# Practical Bridge Erection and Maintenance Methods

## First Series of Contest Papers Describing Solutions of Various Common and Special Problems by Bridge Men

As outlined in the *Railway Age Gazette* of April 16, 13 men, representing 11 roads and one contracting company, submitted 16 papers in the contest on Bridge Construction Methods which closed March 10. The judges in this contest awarded the first prize to S. T. Corey, chief draftsman, bridge department, Chicago, Rock Island & Pacific, Chicago and the second prize to James H. Stack, secretary, the Thomson Bridge Company, San Francisco, Cal. These and other papers are published below and the remaining contributions will appear in early issues of the maintenance section.

### FIRST PRIZE—AN ECONOMICAL METHOD OF REPLACING TRUSSES WITH GIRDERS

By S. T. COREY

Chief Draftsman, Bridge Department, Chicago, Rock Island & Pacific, Chicago, Ill.

The main line of the Missouri division of the Chicago, Rock Island and Pacific crosses the Iowa river about one mile east of Columbus Junction, Iowa. The early history of this crossing is not available, but the first channel spans of the Warren or Thatcher combination type, resting on stone piers, were probably erected about 1868. In the early 90's these spans were replaced by six through lattice spans, each approximately 150 ft. long, on the original substructure. In 1903 it was noted that these stone piers



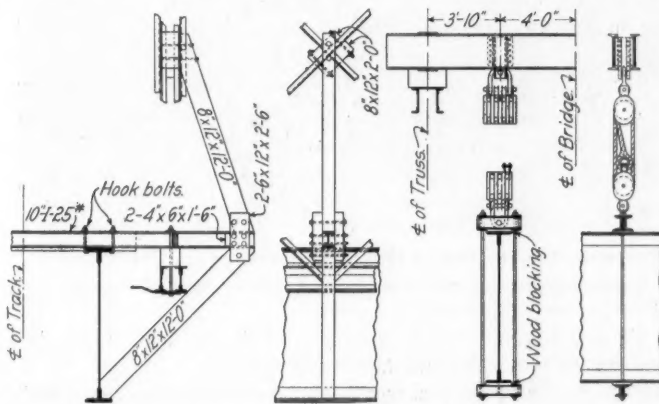
The Old Rock Island Latticed Truss Bridge Over the Iowa River Near Columbus Junction, Iowa

were deteriorating rapidly, and the latticed spans were therefore placed on falsework and four new concrete piers constructed. The present bridge consists entirely of deck plate girder spans on concrete piers and is approximately 1,550 ft. long.

This article covers the replacement of the six through latticed spans by 11 girder spans, which was mentioned briefly in the

the steel was probably not much in excess of 30,000 lb. per sq. in., and great eccentricities existed at nearly all the chord joints. Furthermore, it was thought necessary to renew several combination spans on various branches of the system.

The accompanying elevation indicates the extent of the change made. Piers 2, 3, 4, and 6 had been constructed in 1903, replacing the original stone piers. Their tops were remodeled for the reception of the new girder spans. Piers 1, 1a, 2a, 3a, 4a, 5a, 6a, and 7 were built new, pier 1 replacing one of the original stone piers which had been patched up in 1903 to yield a few more years' service. Pier 5, which was also part of the original substructure,

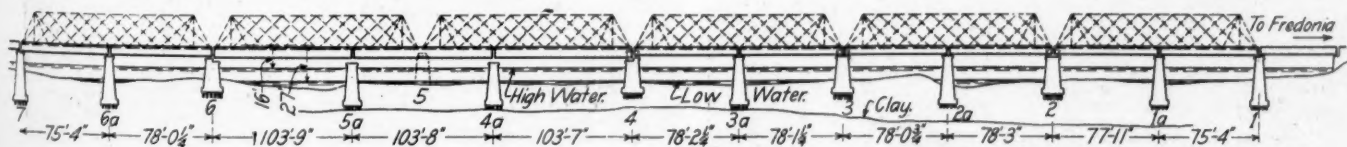


Method of Supporting Old Trusses to Defer Dismantling, and Tackle Used to Support New Girders from Old Trusses

was abandoned. The opening between piers 4 and 6 was divided into three equal parts rather than four, it being figured that the cost of a third pier would be somewhat greater than the cost of the additional weight of the longer spans.

The aggregate length of the truss spans was 928 ft. 9½ in., and to drive falsework under them was estimated to cost at least \$7,500 besides greatly hampering traffic during the driving. There was also the probability that the falsework would go out with the first spring freshet with attendant interruption of traffic and loss of the old spans. As an alternative, it was decided to utilize the lattice trusses in the erection of the new girder spans.

Briefly, the method determined upon to erect the two 75-ft., and the six 77-ft. 9 in. spans, comprised the following operations: A girder span, completely riveted up and with deck on, was brought in on flat cars, being spotted immediately above its final location,



General Elevation of the Chicago, Rock Island & Pacific Bridge Over the Iowa River Near Columbus Junction, Iowa

*Railway Age Gazette* of January 19, 1912. The old bridge was designed for two 95½-ton engines followed by a uniform load of 3,300 lb. per lineal foot, without impact and with a unit stress of about 8,000 lb. With a unit stress of 22,000 lb. per sq. in. (including

impact determined from the formula  $\frac{300}{L + 300}$ ) it was found that

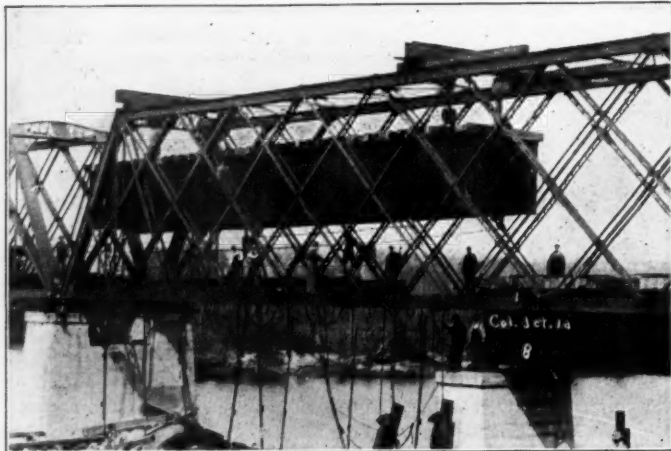
the limiting classification of the spans was equivalent to Cooper's E-45. The weight of the motive power had already reached the E-45 classification, and in a few cases exceeded it, and the introduction of still heavier power was imminent. The elastic limit of

and then raised by block and tackle fastened to loading beams placed across the top chords of the trusses. The old floor was removed while the span was suspended and the latter then lowered to its seats. The loading beams were made from second-hand material.

The steel for the new superstructure was stored in the yard at Fredonia, about one-half mile east of the bridge site. Here the spans were assembled on flat cars, riveted up, and the new decks put on. This arrangement was very effective, as the work of assembly was carried forward without interruption from passing trains. The traffic at this point was heavy, the maximum

interval during the day being about  $2\frac{1}{2}$  hours. The work was arranged to allow the setting of one girder span within this period. No attempt was made to set a record, and no chances were taken other than those inherent in the method used.

Previous to the beginning of the two and one-half hour period, the loading beams were placed in position on the top chords, blocked and lashed. Snatch blocks, rigged in pairs, with lines to be utilized in removing the old floor, were fastened to the truss diagonals. The lines, of which there were two, were operated by



**Removing the Old Bridge Floor Under One of the Short Girder Spans Suspended from the Upper Chord of the Old Trusses**

the derrick engine; first in one pair of blocks and then in the other, as the removal of the floor progressed.

In the yard at Fredonia, meanwhile, the suspenders, block and tackle, were fastened in correct positions on the new span, which, when loaded upon the two flat cars, was placed between the derrick car and a work engine. After the departure of the passenger train, the two cars were moved to the bridge site and spotted, after which the suspension tackle was fastened to the loading beams and the lines carried back to the engine. The engine was cut off from the cars and backed slowly, lifting the span from the cars and raising it as far as the truss clearance would permit. The two cars were then cut off from the derrick



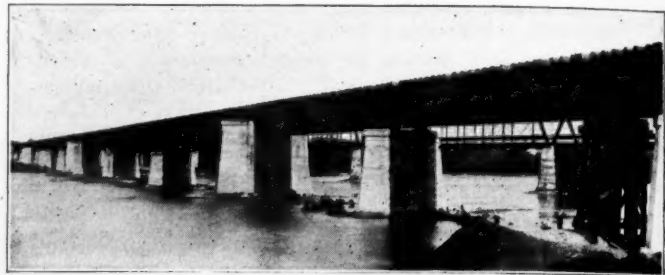
**Removing the Old Truss Members Showing Bracing Used for Their Support**

and moved clear of the suspended span in the direction of the engine, the lines to the latter being long enough to permit the cars to intervene between the end of the span and the engine when the former was lowered on to the masonry.

The rivets in the stringer and floor beam connections had been previously cut out and bolts substituted, so that by means of the lines through the snatch blocks, these members could be removed and lowered into the river in 15 ft. of water. To facilitate re-

covery of the pieces, a rope long enough to reach to the surface of the water was fastened to each and attached at the other end to a float or to the bottom chord of the old truss. After completing this operation the engine slowly moved forward, and the span was lowered to its seats. While the rails were being laid on the new span, the bracing shown in one of the drawings was placed. The track was then made ready for traffic, the entire operation consuming about  $2\frac{1}{4}$  hours.

On account of the great weight and length, it was deemed inadvisable to erect the 103 ft. 4 in. spans in the manner described. An investigation of the stresses resulting in the web systems

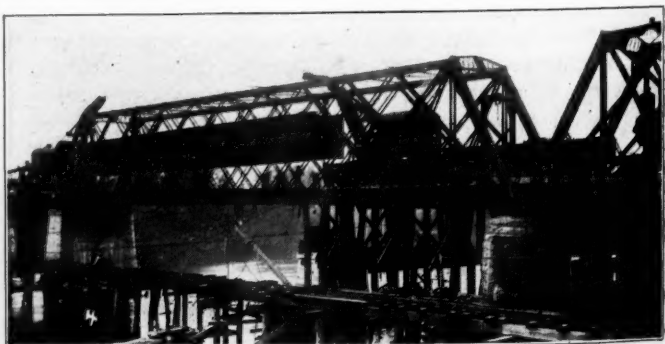


**The Completed Deck Plate Girder Structure About 1,550 ft. Long**

of the truss spans, from the local concentrations of the loading beams carrying these longer spans, showed an ample theoretical margin of safety, but the age of the old spans, the heavy load, and the possibility of unforeseen contingencies developing, made it desirable, if not necessary, to employ other means to erect these spans.

Like the short spans, the 103 ft. 4 in. spans were riveted up complete in the yard, but the deck was not put on for the reasons that greater space under the girders would facilitate subsequent operations, and that the omission of the deck reduced the load to be handled by about 25 tons. Two wrecking cranes, of 100 tons capacity each, were borrowed from the operating department, and, when everything was in readiness a span was picked up by them, one at either end, lifted a few inches above the top of rail, and moved to a point over its final location in the bridge.

Span 5a-6 was the first long span to be erected, and just previous to the arrival of the wreckers with the steel the top lateral bracing was removed from the truss span 6-5 to allow the boom to pass. Girder spans 6a-7 and 6-6a were already in



**Placing One of the Long Girder Spans with Two Wrecking Cranes**

place, and truss span 6-7 had been removed. The old stone pier No. 5 was in such bad condition that it was thought advisable to place three frame falsework bents in each aperture 5-5a and 4a-5 to relieve the pier and also to allow the concentrations of the wrecker to pass directly to the ground. The bents were designed of the two-story type, so the tops could be quickly pushed off when span 4a-5a was placed.

When the two wreckers with the span between them had been spotted, they were clamped securely to the track, and the span was then raised as high as the temporary top lateral bracing, which had been put in after the passage of the first wrecker,



would allow. The old floor was removed in the same manner as previously outlined for the short spans, the span lowered to its seats, and the deck and rails put on. The old trusses were braced in the same manner as previously described.

Piers 2, 3, 4, and 6 had to be prepared for the reception of the new superstructure, since the distance from base of rail to masonry of the truss spans was about 3 ft., while for the girder spans it varied from 9 ft. 8 in. to 12 ft. 11 9/16 in. Fortunately, by cutting the piers in two vertical planes parallel to the axis of the bridge and passing close to the inner edges of the truss shoes, it was possible to provide room for the girders and still leave the truss seats intact. The concrete was cut down low enough to allow about two feet of new concrete to be placed for the girder seats. These were reinforced to prevent cracking and copings were put on. While this work was going on, the end stringers of the old trusses were supported by 8 in. by 16 in. timbers, spanning the notch and resting on the masonry left to carry the trusses. After the old spans were removed, these portions were removed and capped to match the coping already constructed under the new spans.

The following cost data compiled from the erection foreman's reports does not include rent of erection apparatus and tools nor depreciation on the same. The total cost for engineering, including the preliminary investigations, detailing, checking and tracing the plans for the entire job amounted to \$700, and the salary of the field inspector amounted to \$960, making a total of \$1,660. Classifying inspection as engineering, this gives a percentage of approximately 2½ on \$70,000, the total cost of the work.

WEIGHTS				
Span length	No. of spans	Weight each	Weight with deck	
75 ft.	2	39 tons	58 tons	
77 ft. 9 in.	6	42 tons	62 tons	
103 ft. 4 in.	3	80 tons	106 tons	
Total weight of new steel.....			570 tons	
Total length of new steel.....			926.5 lin. ft.	
Total weight of old steel.....			600 tons	
Total length of steel removed.....			928.8 lin. ft.	
DISTRIBUTION OF ERECTION COSTS				
Class of work	Total	Cost per ton of new steel	Cost per lin. ft. of new steel	Remarks
Enroute to site.....	\$281.35	\$0.49	\$0.30	
Changes in masonry.....	1,971.91	3.46	2.13	{ Cutting down piers 2, 3, 4 and 6. Includes falsework for rebuilding Pier 1.
Falsework .....	891.95	1.56	.96	
Unloading ties and piling.	45.68	.08	.05	
Assembling and riveting spans .....	300.37	.54	.32	
Framing ties .....	321.98	.56	.35	
Erecting new steel.....	1,707.69	2.99	1.84	
Removing old spans.....	3,193.23	5.60	3.45	{ \$5.32 per ton of old steel.
Removing falsework .....	201.81	.36	.22	
	\$8,915.97	\$15.64	\$9.62	
Add 2½ per cent.....	222.90	.39	.24	
	\$9,138.87	\$16.03	\$9.86	

The work was carried out under the direction of J. B. Berry, formerly chief engineer, while I L. Simmons, bridge engineer, prepared the plans and supervised the erection.

## SECOND PRIZE—DROPPING OLD TIMBER TRESTLES WITH DYNAMITE

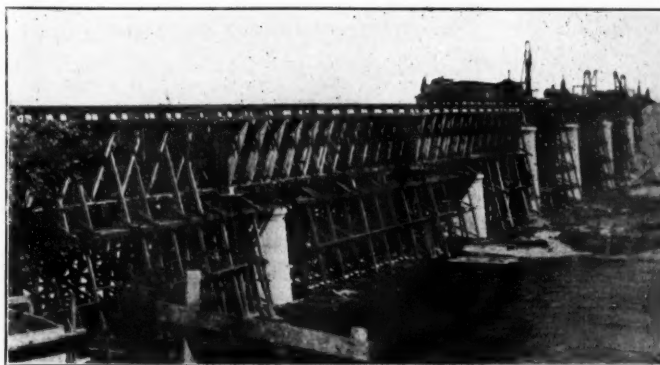
By JAMES H. STACK

Secretary, The Thomson Bridge Company, San Francisco, Cal.

In replacing a number of wooden bridges and trestles on the coast division of the Atchison, Topeka & Santa Fe between Los Angeles, Cal., and San Francisco, a unique method of placing steel girder spans without delay to traffic was worked out by O. J. Crossfield, general manager of the Thomson Bridge Company, San Francisco, Cal, which had the contract for the erection of the new structures. The piers and abutments for these bridges had been built under a separate contract and the steel was delivered at the nearest convenient unloading point to the various sites.

One of the bridges to be replaced was that across the San

Joaquin river at Herndon, Cal., which consisted of three 150-ft. Howe truss spans on pile piers and 450 ft. of framed trestle bents 16 ft. center to center, resting on pile bents, capped just above the ground line. The highest point of the trestle was about 70 ft. above the river bottom. The new bridge consisted of two pin-connected spans 200 ft. long, three 100-ft., one 80-ft. and one 48-ft. deck girder spans, all of which carried an 8-in. creosoted floor with ballasted deck. The alinement of the new bridge was the same as that of the old and the specifications required that "all operations must be so conducted that traffic may not be interrupted." The intervals elapsing between trains varied

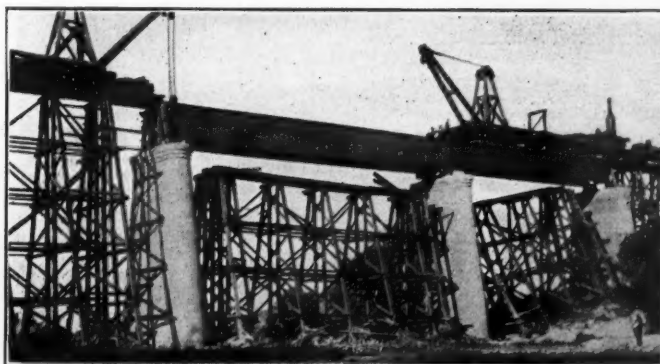


General View of Santa Fe Bridge at Herndon, Cal., Replaced by Dynamiting Trestle Spans

from 45 min. to 3½ hr. The steel for this bridge was unloaded at a siding about 3½ miles from the site.

The erection of the pin connected spans could be carried on without difficulty, but the girder spans presented a serious problem. They had to be transported 3½ miles, the rails, ties, stringers and trestles of the old bridge removed, the girders riveted, the creosoted floor laid and fastened, and the ties and rails placed, all within the interval between two trains. The construction of falsework was out of the question on account of the height.

The method adopted was to support a complete girder span between two special derrick cars and to remove the old trestle by dynamiting the posts. Each derrick car consisted of two 40-ft.



New Girder Spans in Place, Showing Section of Trestle Dropped by Dynamiting

steel flat cars of 50 tons capacity, which were coupled and bolted together so as to be able to travel without changing the distance from end to end. Cross timbers were placed on these cars at intervals of about 10 ft., on which were laid long sills the full length of the two cars to support the towers, boom and engine. The sills were sway-braced to stiffen them laterally and fastened only at the ends so that the cars could pass around curves without bending the sills. The tops of the cross-timbers were also thoroughly greased. A tower 20 ft. high was erected at one end of this outfit, being built up of 12 in. by 12 in. timbers, with a

rigid A-frame boom 35 ft. long projecting at an angle of 45 deg. from the foot of the tower. The back guys were passed over the towers and carried to the farther end of the sills. The derrick and towers were designed to carry safely a load of 100 tons and the cars were ballasted with old rails. Six-sheave steel blocks designed and built especially for this work were provided.

A complete girder span was assembled and riveted on rail skids in the material yard, the creosoted floor being placed and fastened so that as soon as a train had passed the bridge, the span could be picked up by the two derrick cars and the entire train with the girder span between the derricks could be run out to the bridge site. Meantime, a force of men at the bridge bored two holes in each post of the trestle within two feet of the bottom of the posts, and two holes about 12 ft. above these at right angles to them. A stick of dynamite with an electric detonator was inserted in each hole and the entire series wired so that they could be exploded simultaneously.

The train was spotted on the trestle so that the span was in correct position over the pier, the old rails and ties were removed and the stringers cut over the center of the pier. The dynamite was then discharged, cutting off the posts 15 ft. from the bottom and causing the entire trestle between the piers to drop far enough to allow the girders to be lowered into position. The ties and rails were then replaced and the derricks removed. The longest time required for placing one span from the time the regular train crossed the bridge until the rails were placed on the new span was 2 hr. 40 min., and the shortest time 1 hr. 45 min. The trestle bents in many cases dropped so true after the explosion of the dynamite that the posts landed on the sills and remained standing as though originally built there.

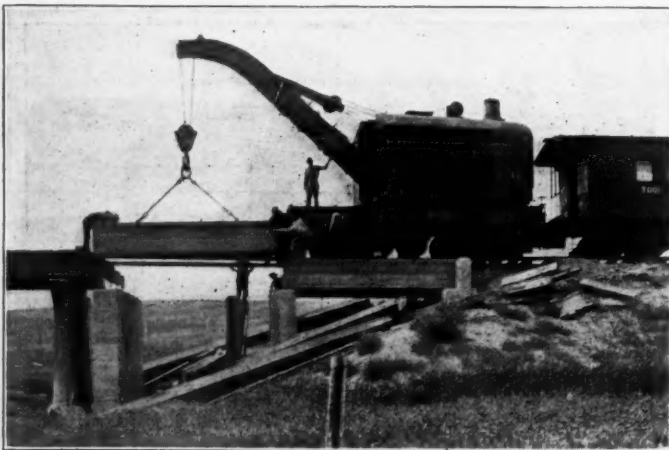
#### ERECTING REINFORCED CONCRETE TRETTLES

By E. M. GRIME

Supervisor Bridges and Buildings, Northern Pacific, Dilworth, Minn.

A number of reinforced concrete trestles have been built on the Northern Pacific, particularly where the main line crosses the bad lands of North Dakota. The alluvial soil of this locality is easily eroded and dry runs become raging torrents during the early spring and summer storms, making it necessary to maintain comparatively large bridge openings.

These concrete trestles consist of reinforced concrete piers,



Placing Concrete Slab on Typical Reinforced Concrete Trestle on the Northern Pacific

spaced 16 ft. center to center, resting on reinforced concrete piles and spanned by reinforced concrete slabs. Erection of bridges of this type is a little more difficult than the ordinary pile bridge, but it was found that the men soon became familiar with the work and it was not long before they would rather drive the heavy concrete piles than ordinary timber piles. The spans being made practically the same length as those in the old bridges which were replaced, the piers were easily located to clear the old structure and a minimum of additional falsework thus required.

These piers enclose the piles for a height of not less than three feet and frequently six or eight feet where the piles have not penetrated to the previously estimated depth. The piers are 30 in. wide and are reinforced both horizontally and vertically, this reinforcing being tied to the piles by  $\frac{3}{4}$ -in. steel rods wound around them. On this account it is necessary to drive the piles practically true to line and with a variation not exceeding 3 in. from the vertical.

The driving of the piles thus becomes one of the most difficult features of the erection of this type of structure and it was found that this part of the work could be greatly facilitated by the addition of a water jet to the regular division pile driving equipment. This consisted of a Fairbanks-Morse duplex general service pump with a working pressure of 150 lb., which at times could be increased to 200 lb. The pump was mounted on the tender of the driver and had a 5-in. suction connected with the water car and a 4-in. discharge reduced to a  $3\frac{1}{2}$ -in. pipe leading up to the driver leads. To this was attached a  $2\frac{1}{2}$ -in. six-ply armored hose ending in the goose neck, which was reduced to a 2-in. jet pipe about 40 ft. long, having a 1-in. nozzle.

As the driver was spotted in position for driving a bent, the jet pipe was drawn up along the leads and five vertical holes were jetted down to the exact position for the piles and to about the depth the piles were expected to penetrate. The jet left a neat hole about 5 in. in diameter which the piles readily followed as driven, and this proved to be a great help in keeping the piles in correct alignment. It was thought the piles might not stand the battering of the 4,500-lb. hammer, but by using a short piece of oak block and a layer of hemp rope to act as a cushion on top of the piles, and with the hammer dropping from 6 to 15 ft., no serious damage was done. They were driven until the penetration was  $\frac{1}{4}$ -in. or less with a 15 ft. drop of the hammer. The piles were selected in from 16 to 30 ft. lengths as best suited the location according to data from the pile driving record of the old bridge.

As soon as the driving of a bridge was completed the concrete crew proceeded with the building of the piers and when these were 30 days old or more, they were ready for the placing of the slabs which had previously been made at the concrete plant and shipped to the site of the work, being unloaded along each side of the track at one end of the bridge. The placing of the slabs, two of which are required for each span, is shown in the illustration which also shows the method of removing the deck of the old bridge one span at a time and blocking up the ends of the stringers on the edge of the new pier, so the bridge can be opened to traffic quickly after the slabs are placed and the track laid. Each slab is 7 ft. wide and 15 ft. 11 in. long and weighs about 15 tons, so it was found advisable to handle them with the locomotive crane working forward from the end of the bridge and building track as the slabs of each span were placed in position. Most of these bridges being located on a rather busy section of the main line, the placing of slabs was not attempted except at times when the dispatcher could allow several hours between trains. In this way the work was accomplished without any serious delay to important trains.

The slabs and piles for this work were manufactured at the Glendive, Mont., concrete plant under the direction of M. F. Clements, assistant engineer, and the writer had charge of construction in the field.

#### REPLACING CAPS ON HIGH TRETTLES

By W. L. RATLIFF

Supervisor Bridges and Buildings, Illinois Central, McComb, Miss.

In replacing caps on high ballasted deck trestle bridges the cost of building cribs to support jacks is often very expensive, especially when only one or two caps are to be replaced and large quantities of old timber are not available. This situation can be met by lashing a 10 in. by 12 in. timber 14 or 16 ft. long across the piles in the bent on which the cap is to be renewed using chains of sufficient length to go around the pile and the stick of timber twice. This timber should be placed at the



proper distance from the lower side of the deck for the operation of a 4 or 5-ton jack which can be used to raise the deck a sufficient distance to allow the caps to be changed. In cases where there are stringer joints on the caps another stick of timber can be bolted to the lower side of the stringers on the opposite side of the caps from the jacks, being sure to place it far enough away to allow swinging the caps, the guard rails in this case being depended on to carry the load of the deck or the short stringers under which jacks cannot be placed. It has been found that a cap can be renewed in this manner in a very short time and at much less cost than by cribbing.

### REPLACING A SMALL BRIDGE OVER A HIGHWAY

By C. V. CHAMBERLIN

Assistant Supervisor of Bridges, New York Central, Utica, N. Y.

The timber trestle over State street in Dolgeville, N. Y., on the Little Falls & Dolgeville division of the New York Central, was recently replaced with a steel bridge on concrete abutments and intermediate steel bents on concrete piers. The old trestle was about 124 ft. long, composed of framed bents and 8-in. by 16-in. stringers, the spans varying from 9 to 16 ft. The new structure consists of three spans of second-hand girders remodeled by the addition of new lateral bracing and floor system. The center span of the through girders is 38 ft. long and the two deck girder approach spans are 26 ft. 9 in. and 28 ft. 9 in. long, respectively. The base of rail was raised to preserve the necessary under-



Progress in Erection of Steel Bridge Replacing Timber Trestle

clearance and the alinement was thrown to a uniform 8-deg. curve as it was previously quite irregular.

The falsework and masonry were put in during December and January. Pile bents were driven at the two abutments and the temporary stringers set for the new base of rail. At the same time the base of rail on the old trestle was raised by laying stringers on the old deck and placing on these stringers a new temporary deck. This has the advantage of stiffening the old structure. Where the excavation for the piers endangered the old timber bent, two piles were driven and capped to support the caps of these bents and be outside the lines of the excavation. This allowed placing the new masonry with the smallest amount of alteration to the old trestle and as the excavation in some

cases had to be carried 8 ft. in rather wet material the piles were quite necessary to the safety of the structure. The steel was laid out on blocking at a convenient level spot where the necessary changes were effected. The floor system for the long span was set in place so the drilling and reaming of the girders would be accurate. The approach spans were cut apart, placed on the necessary skew and the new cross bracing riveted in. The new deck of 8-in. by 10-in. by 12-ft. ties was framed with elevation blocks for 4 in. of superelevation in the track.

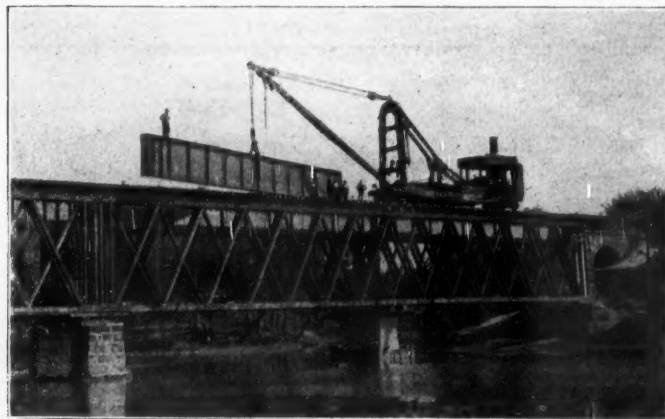
The bridge was erected on February 19 with a 12-ton long boom derrick car. The accompanying illustration shows the old trestle just previous to its removal, the derrick car erecting one of the approach spans and the new structure after the erection of the center span. The work was finished between 11:30 a. m. and 5:20 p. m., 5 hr. and 50 min. As the passenger traffic is light and most of the passengers use the Main street station which is south of the bridge, it was possible to cut out traffic completely over the structure during its erection. This work was handled under the direction of E. L. Jenkins, supervisor of bridges.

### RENEWING HOWE TRUSSES WITHOUT DELAY TO TRAFFIC

By J. J. WISHART

Supervisor Bridges and Buildings, New York, New Haven & Hartford, Hartford, Conn.

The two-span wooden Howe truss bridge of the New York, New Haven & Hartford over Water Shops Pond, Springfield, Mass., which had been in service 39 years, was recently replaced by a four-span deck plate girder bridge without interference to traffic. Each of the old spans was 153 ft. 3 in. long, supported by a brown stone pier and abutments. The new spans are each 76



Replacing Howe Trusses with Deck Girder Spans on the New Haven

ft. 8 in. long, requiring a new concrete pier at the center of each old span.

The old center pier had to be renewed down to the water's edge, a distance of about 8 ft. The brown stone was cut away between the two lower chords, leaving the bridge supported on two small pedestals above the water. The cutting was done by contractors and a company mason followed, pointing all seams and old cracks. On the surface of the two small pedestals 25 bbl. of cement were poured, making them solid and saving the cost of carrying the bridge on falsework, which would have amounted to several hundred dollars.

In the construction of the first new pier a cofferdam was driven and the water had been lowered about 21 ft. when the bed of the pond inside the dam broke, allowing water and mud to rush in. An attempt was made to place sand bags to seal the dam, but this proved unsuccessful. Permission was therefore secured to drive piles on which to carry the pier, a self-propelling pile driver working on the old bridge with a 20-ft. follower and a set of gins on the lower chord, being used for placing these piles. The surface of the water was 30 ft. below the top of the bridge. The water was 22 ft. deep and 23 ft. of sand and mud overlaid

the solid bottom. After the piles were driven, the bottom was sealed by placing concrete through a 10-in. galvanized tube to a depth of 4 ft. The cofferdam was then pumped out, the piles cut off and the pier finished. The foundation for the second pier was handled without trouble in the same manner.

During the erection of the new steel the old trusses were blocked on the new piers, as the derrick car when setting the girders was 60 tons heavier than the capacity of the bridge. The derrick boom was only 35 ft. long. The first span was replaced on a Friday morning, the ties and floor stringers over the first pier being cut and the tower set between trains. After a passenger train crossed the bridge at 10:20 a. m., the rails, ties, stringers, top rods, top lateral braces and sway braces were removed with the derrick car, and the new girders erected in the space between the old trusses. While the girders were being set the bridge and section gangs brought new ties on push cars from the west shore and while the braces and laterals were being bolted up the bridgemen placed the ties and the section men the rails. A freight train passed over the bridge at 1:05 p. m., 2 hr. 45 min. after breaking the track. On Sunday two towers and two spans were placed, there being no trains to interfere with the work, and on Tuesday the last span was set between trains.

### A SMALL PORTABLE STONE CRUSHING OUTFIT

A considerable number of railway structures are built of concrete every year in locations considerably removed from a source of crushed stone, making this material unusually expensive, although field boulders or stone from excavations may be available near the work. In order to make it possible to utilize such material as aggregate in concrete a small portable crushing outfit has been developed by the Smith Engineering Works, Milwaukee, Wis. As the first requisite for such an equipment had to be small size and portability, and, as it is intended solely for use on

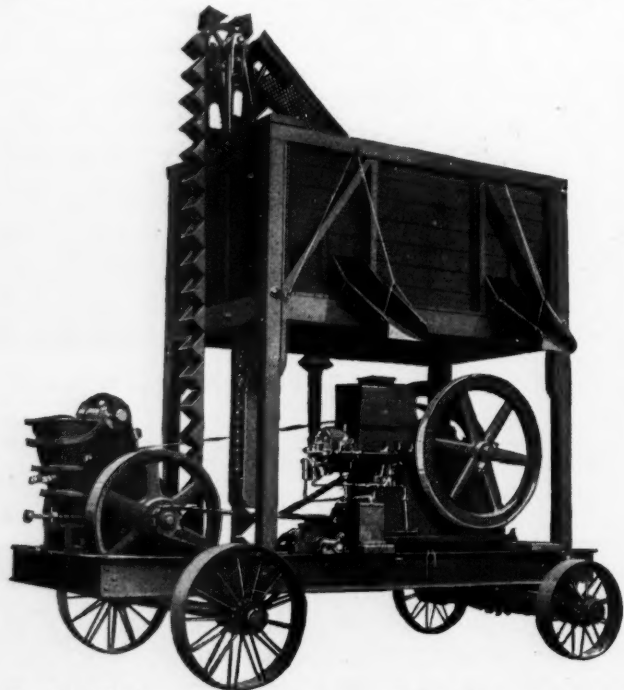
tons per hour, and in producing 1½-in. sizes and under the output is about 4 tons per hour.

The outfit, which is known as the No. 7 contractor's portable crushing rig, consists of a No. 7 Telsmith jaw breaker, a 12-hp. double opposed cylinder engine, elevator screen and bin, all mounted on a single steel truck. The crusher has a 7-in. by 10-in. opening, manganese steel die plate, cast steel frame, direct crushing stroke and enclosed eccentric. The double opposed cylinder engine is particularly adapted to this work because of its reduced weight and continuous power. A reciprocating feeder conveys the stone from the crusher to the elevator, the feeder being operated by the swinging jaw of the crusher. The stone is raised to the bin by a vertical single-chain elevator, with 7-in. by 4½-in. by 5½-in. bucket, the chain being of malleable iron and the boot of steel. The elevator has a folding section at the top to reduce the required head room. The equipment can be furnished with a chute screen with perforations made to suit, or a rotary screen of the central shaft type 16 in. in diameter and 4 ft. long. The bin is of the flat bottom, portable type, with four bin gates. It has a total capacity of five tons, of which about three tons will run out by gravity.

The equipment is mounted on an all-steel truck with 8-in. channel sills strongly braced. The front axle is a steel channel with cast steel skeins, and the rear axle is of cold rolled shafting 2 15/16 in. in diameter. The front wheels are 24 in. by 6 in., and the rear wheels 30 in. by 6 in. The entire outfit weighs about 9,000 lb. without a rotary screen, which adds about 400 lb. to this. It can be pulled by two horses on a paved street, and four horses will take it anywhere that an automobile can be driven.

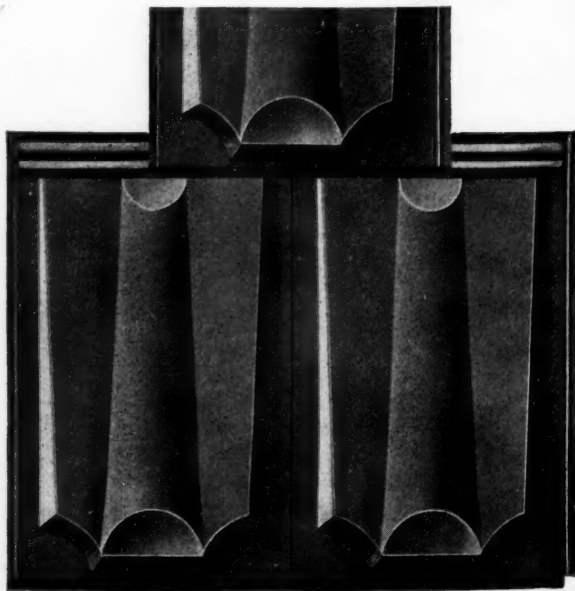
### AN ORNAMENTAL TYPE OF METAL SHINGLE

A new type of metal shingle which is adapted to use on the roofs of railway buildings where the pitch allows, has recently been placed on the market by The Berger Manufacturing Company, Canton, Ohio. The principal change in design as compared with the "Chieftain" and "Swanee" metal shingles made by this company, is that the design is more ornamental than the previous patterns. In common with the other Berger shingles the new



Crusher, Engine, Elevator, Screen and Bin Mounted on a Steel Truck

small work where the volume of stone needed does not warrant the expense of moving and setting up a big crushing plant, the output and cost of production can scarcely be compared with ordinary figures of this kind. It is estimated, however, that the cost of crushing stone with this equipment is from \$0.70 to \$0.80 a cubic yard, based on the use of field boulders and including the cost of gathering and hauling the stone. This also includes an allowance for depreciation, fuel, interest on the investment, etc. The capacity of the plant in producing ½-in. stone is 2 to 2½



The "Berco" Metal Shingle

design is made with a three-point contact lock construction and an end lap providing high corrugations at the top. This serves a two-fold purpose, facilitating the application and at the same time making the shingles automatically interlocking and self-aligning, while the knife edge at the top insures a tight joint and prevents capillary attraction. These shingles are 10 in. by 14 in., and are made either from galvanized rust-resisting Toncan metal, galvanized open hearth steel or painted terne plates.



# The Organization for and Methods of Relaying Rail

## Three Discussions of Practical Organizations for This Work, on Lines Having Heavy and Light Traffic

One of the most important classes of work in which the maintenance of way department on most roads is now engaged is that of relaying rails. Because of its direct interest at this time we publish below three articles discussing various phases of this problem as they have been worked out on different roads.

### LAYING RAIL ON A BUSY LINE

By W. F. RENCH

Supervisor, Pennsylvania R. R., Perryville, Md.

On lines of intensive operation where the available intervals between trains are never more than 25 min. and where intervals as low as 12 min. must frequently be utilized it is of the utmost consequence that the preliminary work be done to the last item. No single operation that can be completed before the track is broken must be omitted. The cutting of a closing rail is entirely out of the question and this must be provided for beforehand by careful determination with the steel tape. The number of rails that can be laid in a given interval must be known and though this is somewhat variable it will be found close to a rail a minute for intervals between 10 and 25 min.

The rails must be as near the place where they are to be applied as possible and all needed material must be close at hand. The distant flagman must be trained to receive instantly the flag signal to begin protecting and must respond just as promptly when the signal is given to withdraw. The need for immediate action by each member of the rail laying force is no less insistent.

There is no item of work wherein the matter of detail is of such importance as rail renewal, which of necessity causes a break in the track. A specific duty is laid upon each member of the gang and remains for every operation, so that no further line-up is required. Maintenance rules generally require that the rails shall be laid one at a time and similarly forbid the withdrawal of spikes or the removal of bolts in advance of the renewal. This severe but necessary restriction can be met by perfect organization.

The bolts at the joints to be broken have washers added until the nut has just a safe hold. Two of the best workmen are assigned to each end of the run to be relaid. Ten men with claw bars are delegated to remove from the chosen side of the rail the spikes which have previously been started to assure their coming out readily. Eight men with lining bars push the old rail aside, two dislodging it, one guiding it across the new rail and five lining it away. Four men follow closely, two with spike mauls and punches to drive down the butts of broken spikes, one with an adz and one with a stiff broom to sweep aside chips of wood, pieces of ballast and spikes. Twelve men with tongs put the new rails in place as fast as the old are removed and 10 men working in pairs apply the splices with half their complement of bolts. Two men push the rail under the spike heads and spike the joints and centers while the 10 men who were pulling spikes but who are now free spike the rail upon every other tie. Four utility men put the cut rail in place and look after the compromise joint in case a different section is being laid. The gang which threw out the old rail completes the full spiking and the men with the tongs assist in applying the remaining bolts, giving them all as full tension as possible. This force of men generally consists of two gangs and, in addition to foreman and assistants, numbers about 50 men.

The preliminary work in renewals of this character largely determines the efficiency of the gang. In the event a different section of rail is used in renewal, the first work upon the arrival of the relaying gang is to remove the tie plates, the ties that were without tie plates being adzed down when these are in the

minority and those surfaced up that carried the tie plates when they are in the minority. After this is done the detailed surface of the track is given attention so that the new rail may lie upon as smooth a bed as possible. The ties must then be adzed to a level seat alongside the rail. The point of beginning must next be established and where possible this should have especial regard for the existing locations of block joints when these cannot be changed so that the introduction of unusual lengths of rail in the main track at isolated points may be avoided. In the event that this necessitates laying the rail against the current of traffic, temporary rails of the new section are used so that the approach ends of the permanent rails will not be injured. The rails are then strung out just outside the ends of the ties to be as near their final positions as possible and incidentally to indicate the new positions of the joints for use in the preliminary tie spacing. This method is not accurate on sharp curves and the position of the joints must be determined in such cases by careful measurement with a steel tape after the average length of the new rails has been carefully ascertained. When the rails are set up for the purposes named it would be an unnecessary refinement to use shims and many of the shims would surely become lost. It is quite sufficient to place a number of the rails, five in summer weather, with their ends in contact and separate each five with a spike, which represents the aggregate of the several spaces.

When the preliminary spacing is completed so as to assure the flanges of the splices entering without exception the word is given and the men line up to await the foreman's signal that use of track has been given, communicated from the telephone box or from his field telephone connected with the dispatcher's telephone line. The principal protection is the distant flagmen, who not only display a red banner but place torpedoes on the rail. The signalmen, whose duty it is to bond the track, further by means of a wire shunt the track circuit so as to display the danger signal at the nearest signal; but at the immediate location the foreman's red flag is always in evidence until replaced by a white one to indicate that all protection may be withdrawn and traffic be allowed to run as usual. This assumes that all ties are fully spiked, all bolts inserted and made tight and at least two bond wires are in place at each joint.

### RAIL LAYING ON LINES OF MODERATE TRAFFIC

By E. R. LEWIS

Assistant to General Manager, Duluth, South Shore & Atlantic

It must be borne in mind by all concerned that rail laying is, in its sphere, of equal importance with train operation; that it is a necessary menace to safety; and that extraordinary vigilance is required to prevent accidents to persons and to property, from the time of distributing the first car of rail until the cancellation of the last slow order. No more important duties are delegated by the track foreman to any employee than those of the flagman. Flagmen should be most carefully selected, drilled and instructed. Preferably they should be experienced trainmen. The track foreman's orders to flagmen and to material trainmen, insofar as is possible, should be given in writing from carbon copy note books. Too much care cannot be exercised to prevent misunderstanding of orders affecting traffic.

The efficiency of a track-laying gang depends on the program laid down, on the continuity of the work, on the delivery of materials, on the class of labor available, on the personality of the foreman, and most of all on the completeness of understanding and the helpful co-operation existing among officers and employees of all departments. On lines of moderate traffic, depending in part on the weight of materials to be handled, and in part

on the mechanical contrivances in use, a track laying gang may be organized about as follows:

- |                                   |                       |
|-----------------------------------|-----------------------|
| 1 foreman,                        | 5 adz men,            |
| 1 or 2 assistant foremen,         | 5 spike pullers,      |
| 1 time keeper and material clerk, | 6 spikers,            |
| 2 flagmen,                        | 2 tie plate handlers, |
| 4 splice men,                     | 5 men of all work,    |
| 8 tong men,                       | 1 tool car man,       |
| 2 tie plug drivers,               | 1 water boy.          |

If, as is usual on lines of moderate traffic, a boarding train is necessary, one cook, one assistant cook and one or two chore boys will probably also be needed. Since the boarding train must be set out on temporary spur tracks between stations, a field telegraph office and a telegrapher will be of decided advantage, especially to the material train operating in conjunction with the track laying gang.

The boarding train may consist of:

- 1 foreman's car with office and sleeping quarters for 6 men.
- Sleeping cars for 45 men, so partitioned that not more than 4 men sleep in one well ventilated compartment, in single bunks preferably of metal frames requiring no mattresses.
- 1 cook's car, to accommodate 4 men.
- 1 kitchen car.
- 1 stores car.
- 1 dining car—Foreman and men should eat together—Special diners and special dishes breed trouble.
- 1 fuel car.
- 1 tool and blacksmith's car.
- 1 laborers' day coach—for use of laborers with material train.
- 1 locomotive tank—for water supply.

The most important man of the organization is the foreman. To be successful he must be an organizer of executive ability. Preferably he should be permanently employed and well acquainted with the road, its rules and its labor supply. If so, he will be able to attend in part to the outfitting of the boarding train and the gathering of a small gang at least, of track laborers who are well acquainted with the territory, expert in their duties, and of service in teaching new men. The foreman will be able to help select his tools and equipment, and to profitably employ the gang while recruiting is in progress. The more efficient the foreman, the better will be the assistants he hires, and the gang he keeps. Understanding between the foreman and men minimizes the difficulties of nationality. There are rail laying gangs composed of natives of various countries other than America equal to the best American labor.

The idea that foreign labor is inferior to our own is largely the result of American ignorance of, and carelessness about, learning foreign ways. Proper treatment and determination to establish an understanding with laborers of any nationality, will usually overcome most obstacles to efficiency. It is largely a case of placing oneself mentally in the foreigner's position, of getting his view point and of treating him accordingly.

A good track foreman will devise ways and means of retaining the services of a gang almost intact during a season's work. This requires tact, system, ability to teach, to understand, to deal justly and wisely, to organize, to grade and reward and punish, and through all to retain respect. Yet such foremen are available and ready on every railway. Much of the present scarcity of good foremen is due probably to a certain dearth of judgment of human nature in those who must select and train them. The assistant foremen should be experienced trackmen, preferably extra section foremen, or sub-foremen. They should be carefully selected, trained and given direct charge over not more than 20 men. Their ambition for advancement should be carefully nurtured.

A good blacksmith should be selected, if possible, as tool car man. Besides caring for and accounting for the tools he can, if provided with a blacksmith's kit, a small anvil and a portable forge, save the company time and money by repairing rail laying tools promptly and by saving the shipping of them to and from division points for repairs.

The selection, transportation, refrigeration and serving of clean, plain, wholesome food; the sanitation of the camp; the disciplinary arrangements for the "off days," Sundays, pay days, holidays and rainy days; the weeding out of undesirables; the grading of wages; the excellence of the work report system; and forethought in ordering supplies of all kinds, are matters of moment in rail laying economics.

This procedure depends in fact on the same team work, on the same individual efficiency, on the same intelligence, integrity, diligence and wisdom as form the basis of all worthy human endeavor. The best results are only obtainable through the best efforts of mind and body of the men of all ranks employed on the work.

## LAYING RAIL ON THE LEHIGH VALLEY

By G. L. MOORE

Engineer Maintenance of Way, Lehigh Valley, South Bethlehem, Pa.

All rail is handled by machines—locomotive cranes, steam ditchers, steam derricks and air loaders being used. Several machines are used in one work train in distributing new rail. The length of track per car load is blocked out, and the work train is split up into sections so that the locomotive handles the air loaders and each locomotive crane handles a section consisting of itself, two cars of rail and a steam unloader, the locomotive crane propelling the section and unloading one car of rail on one side of the track and the steam derrick or ditcher unloading the other car of rail on the opposite side of the track. Short rails are unloaded at each signal or cut section to permit squaring the insulated joints within 10 ft. without cutting rails. Joints, bolts and new anti-creepers, where required, are unloaded the same day.

In loading up relayer rails, the work trains are operated in the same manner as in unloading. Each rail is numbered in the order in which it came out of the track and is loaded consecutively in the same order so that when relaid in side lines or freight main tracks they are in the same order, thus avoiding any possibility of mis-matched joints. The rails are loaded in the cars in single tiers, heads up, with strips between each tier.

The high record so far for loading relayers with one work train in one day is 115,817 ft. of 90 lb. rail, including joints and bolts, in 37 cars. Nine machines were used in this train. Figuring in miles of track 10.96 miles of track was cleaned up of rail, joints and bolts with one work train in one day. This was all of the rail in this particular stretch and from our experience in this and other cases, we know that we have not reached the limit of efficiency in this work and believe that it is possible to load or unload the rail for 15 miles of track with one work train in one day.

The high record amount of new rail unloaded by one train in one day has not as yet quite equalled the figures for loading rail quoted above, but there is nothing, in our opinion, to prevent doing so and when we next receive new rail, which will be next fall, we fully expect that we shall find it possible to unload the rail, joints and bolts for 15 miles of track in one day with one work train.

The cost of loading or unloading rail, using several machines in a work train, runs from 18 to 23 cents a ton. The rails are placed on the ground in exactly the same location or order for convenient laying as though the work were done by one machine or by manual labor, and the rails are loaded in exactly the same manner and placed in the cars in order for convenient unloading again, the same as though done with a work train using only one machine and much better than when done by a loading gang of men.

It may be well to call attention to the fact that in using machines, whether one or several, in a work train, the rail is not injured and neither in our experience have men been injured; while in handling rails by hand the rail may be damaged and it is known from past experience that the men are frequently hurt and in many cases very severely.

Expansion is allowed in laying rail as follows:

- 100 deg. F., lay rails tight.
- 80 deg. F., lay rails 1/16 in. apart.
- 60 deg. F., lay rails 3/16 in. apart.
- 40 deg. F., lay rails 3/16 in. apart.
- 20 deg. F., lay rails 1/4 in. apart.
- At zero F., lay rails 5/16 in. apart.

Steel shims are used and thermometers are frequently consulted. The temperatures shown in the table are those shown by a thermometer in the shade. Anti-creepers are applied the



same day the rail is laid and their application is considered a part of the work of laying rail.

We lay practically all of our rail in the winter. Wherever there are any low ties, thin shims are used. We find it necessary to use very few such shims and our experience shows that our rail is not damaged either by the methods of laying it or by our plan of maintaining track.

During the past winter we laid 34,464 tons of new 100 and 110-lb. rail. We shall lay no more new rail until next winter; this conformance with the policy which we adopted five years ago of laying our new rail in the winter, reserving the summer season for the work of surfacing track and renewing ties. During this time we have not disturbed our track for the express purpose of spacing the ties to fit the joints and we now have in our main passenger and freight running tracks about 160,000 tons of rail so handled. We have yet to find the first case of damaged rail by reason of not spacing joint ties, but have been able to greatly improve our track by diverting the labor, in former years so employed, to the most important work of improving the surface and line and renewing of ties. We feel that there is absolutely no good reason for spending large amounts of money simply to space ties to fit the joints, which money applied otherwise would count for so much more.

In common with many other heavy traffic lines which had not done so before, we have for the last four seasons been increasing the number of ties in our heavy traffic track. Where formerly we used 18 ties under a 33 ft. rail, we are now putting in 20 ties. This work will near completion this season. In surfacing our track, renewing bad ties and increasing the number of ties to 20 to the rail, in many instances where the renewals are heavy and where it may be done without increased cost, we do space the ties to fit the joints. We have still in our main passenger tracks stretches where there are 18 ties per rail length where the ties were never spaced to fit the joints and we have many stretches of track where the track was surfaced and 20 ties per rail used before the new rail was laid and where nothing was or will be done in the way of respacing the ties. One of the great advantages of our method is that it is not necessary to wait until any specified time to surface bad track because we are going to lay new rail, but at all times we rebuild our worst track first regardless of rail renewals, and after new rail is laid and the track surfaced, it is impossible to tell, except by inspection on the ground, which was done first or, in other words, whether the ties are spaced to fit the joints or not.

Most of the rail is laid with large forces, frequently trains being detoured over other tracks. The organization for rail laying under such conditions is as follows:

	Foremen	Men	Wages
Removing anti-creepers .....	1	3	\$6.95
Pulling spikes .....	1	18	29.45
Throwing out rail .....	1	10	17.45
Setting in rail .....	1	24	38.45
Spiking .....	2	14	25.90
Drilling for bonding .....	10		15.00
Bonding .....	4		10.20
Jointing and bolting .....	2	24	40.90
Reapplying anti-creepers .....	1	10	17.45
Motor car distributing water and material and signal work .....	1	3	6.95
Total .....	10	120	\$208.70

Very frequently forces from adjoining supervisors' territories are used, each force laying the rail on one side of the track. In some instances we have had three such forces together and the greatest amount of rail laid in one day was 7.85 miles of track. Doing the work in this way, great rivalry is set up between the different forces and the rail is laid very rapidly and very cheaply. Another argument in favor of this plan is that the delay to traffic is small and covers one day only for such a stretch of track, whereas using small forces the traffic would suffer delays many days.

Our rail gangs are all supplied with portable telephones, so that the foremen are in frequent communication with the dispatcher and in locations where it is impossible to divert trains over adjoining tracks the delays both to trains and to the gang laying rail are reduced to the minimum.

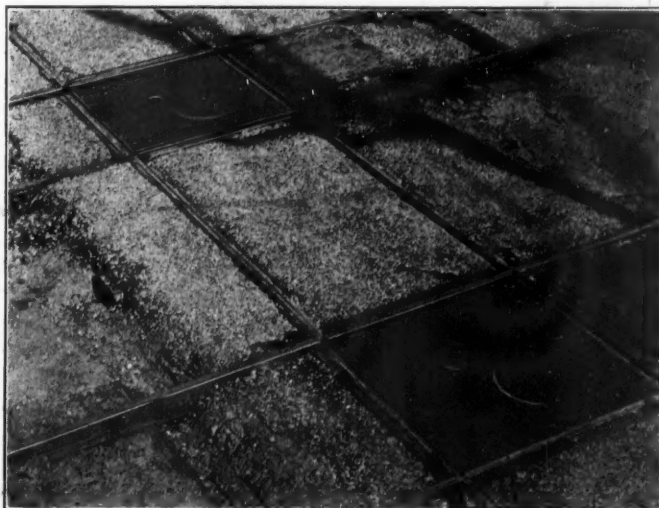
On a single track main line loop over which our important passenger trains are run, besides considerable other traffic, 4.5 track miles of new rail was laid in one day during the past winter, two forces as per the statement above being employed. In this case, of course, it was necessary to close up for the passage of all trains. On our light branches, it is impracticable to get such large forces together and the work is usually done with a small extra gang combined with nearby section gangs. On these branches there is no signal work to be done.

In all our work we endeavor to foster a spirit of friendly rivalry between divisions and between sub-divisions. Records worthy of note of all work accomplished in one day by any division is published on all divisions. The high records so far are as follows:

Laying new rail on track from which traffic has been diverted for the purpose of the day .....	7.85 miles
Laying new rail on track from which traffic could not be diverted .....	4.56 miles
Track miles of rail handled with one work train in one day .....	10.96 miles
Coal cars of ashes unloaded for shoulder on main line with one work train in one day .....	125 cars
Cross ties unloaded and distributed along main line track for renewals with one work train in one day .....	128 cars containing 28,094 ties

## THE COBB SHOCKLESS RAILROAD CROSSING

At the intersection of the four-track line of the Pacific Electric and the single track line of the Atchison, Topeka & Santa Fe at Slauson Junction, near Los Angeles, Cal., two crossings of a new type with movable rails are in service. The first of these has been subjected to a very heavy traffic at this point for more than six months. The electric road handles a daily traffic of over 15,000 tons, consisting of 360 high speed electric cars made up in 240 trains and the steam road handles about 5,000 tons of traffic per day, a large part of which is in heavily loaded oil trains hauled by Consolidation locomotives. During the time these crossings have been in operation they have never caused a delay to trains and they have cost nothing for repairs and maintenance with the exception of the general in-



Two Cobb Shockless Crossings in the Tracks of the Pacific Electric and the Atchison, Topeka & Santa Fe

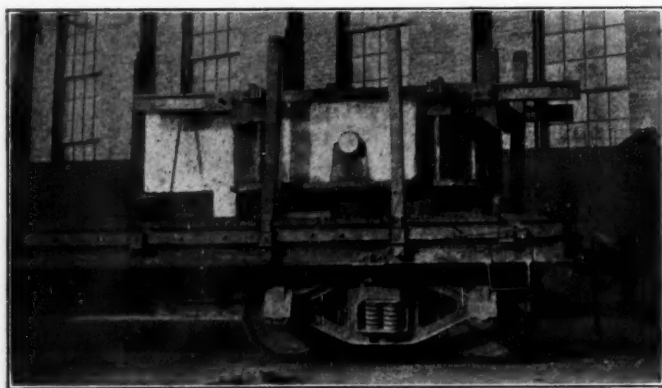
spection and lubrication, which is given to all of the mechanism in the interlocking plant.

This design consists of four or more rails forming the closing members of the intersection, which are moved vertically between solid fixed guides to bring them up level with the rails on either side or to drop them out of the way of wheel flanges on the cross track as may be desired. The ends of the movable rails are mitered to form an interlocking joint, providing for continuous support of the wheels passing over the crossing on either track. The vertical motion amounting to 1 3/4 in., is imparted by two wedges under each rail at its extremities, as at the ends of a draw bridge, these wedges moving longitudinally with

respect to the rail and being designed to draw the rails downward when they are withdrawn. The wedges under the several rails are so connected that when one pair of rails is raised to the operating position the other pair is drawn downward to its lower position. The rail is under absolute control in all its positions and is locked solid when in position for use, so that no rolling load comes upon the wedges except in the fixed position.

The operating mechanism is located below the surface of the ground and enclosed in the main foundation frame of the crossing. This mechanism consists of gears, links and wedges, all having slow motion and ample wearing surface. In the two installations referred to the crossings are operated by motors enclosed in small water tight boxes within the foundations, but it is possible to arrange the mechanism for operation by hand, switchstand, compressed air or any other method deemed advisable or necessary, the only requirement being that the main driving shaft running under the crossing shall be revolved 180 deg. to bring one pair of rails into the effective position, and then 180 deg. in the opposite direction to bring the other pair up. There are no moving parts above the surface of the ground, the entire space within the crossing rails being covered as shown in one of the illustrations.

When the first crossing was placed in service it was equipped with a 1/2-hp. second-hand slip switch derail motor and a pole changer, borrowed from the signal department of the Pacific Electric, the entire arrangement being considered temporary in order to test the device and allow any mistakes that had been made in its construction to be corrected. As this crossing worked



A Cobb Shockless Crossing Ready to Install

with absolute satisfaction, with the exception of the improvised actuating mechanism for more than three months under adverse weather conditions and heavy freight and passenger traffic, it was taken out for the purpose of installing suitable actuating and control apparatus for the permanent installation. The new motors, quick acting device and proper pole changers which were installed have given such good satisfaction that a second installation with the same details has been made. The present motors consume about 6 amperes of current at 110 volts in operating the crossing, requiring about 3 1/2 seconds for the change of position. The crossings are also equipped with an emergency provision for operating by hand, and it has been found that a man can readily operate the rails with a hand wheel similar to those used on ordinary hand brakes, indicating that the power required for operating the device is small.

These crossings are controlled by a lever in the all-electric machine in the interlocking tower and are properly interlocked with the signals, derails and switches. It is so arranged that the crossings cannot be thrown when a train is standing on them or is approaching them. The cost of installing these crossings is said to be no greater than that of an ordinary intersection, and the cost of manufacture is only slightly greater than that of a built-up rail crossing. The only additional expense for most installations would be that represented by the cost of electric motors or hand operating mechanisms for moving the rails.

The claims made for this crossing include the following: It prevents shock, which with ordinary crossings results in noise and in wear on equipment and track work entailing additional maintenance costs. The main frame or body when once placed on a good earth or concrete foundation, will last indefinitely and all parts subject to wear can be replaced without disturbing the foundation. The rails used may be of any cross section used in the adjacent track, and they do not wear any faster than the rails in the adjacent main line, as they are subjected only to rolling wear without shock. The crossing can be operated from a tower, from a moving train by electrical contact, or by hand, air pressure, or otherwise. It can be applied to any angle of intersection or to combined intersections of broad and narrow gage track, or to a three-rail intersection when both broad and narrow gage tracks use one of the three rails in common. The rails cannot be moved sideways by a force less than that which would cause the flange to climb the rail; the rails cannot be clogged by snow or ice or by any material dropped or placed on any part of the crossing; there are no parts of the operating mechanism exposed to view or to the weather preventing their being tampered with.

This crossing is made by the Cobb Shockless Railroad Crossing Company, 1121 Central building, Los Angeles, Cal.

## ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since April 16, 1915:

Substructure of the New "Harahan" Bridge at Memphis.—The Rock Island, the Iron Mountain and the Cotton Belt, are building a joint bridge across the Mississippi river at Memphis. The substructure, completed last January, involved a number of interesting problems which were described and illustrated in the issue of April 23, page 877.

Frisco Seawall at Cape Girardeau, Mo.—The St. Louis & San Francisco is constructing a concrete and riprap retaining wall 1,800 ft. long at Cape Girardeau, Mo., to reclaim a considerable area from the Mississippi river and permit the straightening of the main line. This wall was described in a short illustrated article in the issue of April 23, page 889.

The Alaskan Government Railways.—The adopted location for the Alaskan government railways was described briefly in an article accompanied by a map in the issue of April 23, page 896.

The Success of Main Line Electrification.—The results secured from the electric operation of the main line of the New Haven from New York to New Haven, including the Westchester, Oak Point and Harlem River yards were described by W. S. Murray in an illustrated article in the issue of April 30, page 923. This article was accompanied by several tables giving detailed data.

Reasons for Building the B. & O. Magnolia Cut-Off.—The Baltimore & Ohio has recently completed the Magnolia cut-off described in the issue of July 17, 1914. The reasons justifying this \$6,000,000 expenditure were outlined by A. W. Thompson, third vice-president, Baltimore & Ohio, in the issue of April 30, page 934.

New Clearance Regulations in Illinois.—The State Public Utilities Commission of Illinois has recently issued new horizontal and vertical clearance regulations which were published in our issue of April 30, page 940.

Construction of New Line to Reach Utah Coal Fields.—The Utah Railway Company has recently completed a line 27 miles long to reach coal fields at Mohrland, Utah. The construction of this line involved a number of interesting problems in connection with the disintegration of shale in embankments. This line was described in an illustrated article in our issue of May 7, page 971.

Lining Tunnels on the New Lewistown-Great Falls Line of the St. Paul.—On the Great Falls extension of the St. Paul, described in the *Railway Age Gazette* of April 2, 1915, there were six tunnels aggregating one mile in length, all but one of which were lined with reinforced concrete. The methods by which this lining was placed were described in the issue of May 7, page 978.

The Pennsylvania Improvements Through Piqua, Ohio.—The Pennsylvania has recently completed extensive improvements through Piqua, Ohio, involving interesting work which was described in our issue of May 14, page 1003.

The Federal Valuation Program.—The Interstate Commerce Commission has outlined the program for the valuation work for the next two years. This program was published in our issue of May 14, page 1014.

New Line of the Chesapeake & Ohio Northern.—The Chesapeake & Ohio recently let contracts for the construction of a new line from Edginton, Ky., to a point near Waverly, Ohio. This new line was described briefly in the issue of May 14, page 1017.



## DETERMINATION OF ANNUAL CHARGE FOR TIES, POLES AND FENCE POSTS

By W. F. GOLTRA

President, W. F. Goltra Tie Company, Cleveland, Ohio

At the last annual meeting of the American Railway Engineering Association the Committee on Ties presented a report on the economic comparison of railroad ties of different kinds for adoption and publication in the Manual, which included the following formula to determine the annual charge:

$$r = C \times \frac{(1+p)^n \times p}{(1+p)^n - 1}$$

In which

$r$  = annual maintenance charge or return.

$C$  = initial expenditure or cost of material in place or investment.

$n$  = average useful life of material or years of recurring period.

$p$  = rate of interest including taxes.

In order to determine the relative economy of different materials such as ties, poles and fence posts, it is first necessary to ascertain the annual maintenance cost of each of the materials compared. The annual cost or annual charge is dependent upon three elements; first, cost of the material in place, second, useful life of the material, and third, rate of interest on the investment, including taxes.

### TIES

By the above formula the annual sum ( $r$ ) required to liquidate within the course of ( $n$ ) years a debt now incurred is ascertained by dividing the cost of the material in place ( $C$ ) by the present value as shown in the accompanying table, prepared by the author to facilitate the computations. To calculate each case separately according to the formula would be very tedious and laborious. For example, suppose  $C = \$1.00$ ,  $n = 10$  years and  $p = 7$  per cent. Substituting these numerical values in the equation, we have,

$$r = \$1.00 \times \frac{(1 + 0.07)^{10} \times 0.07}{(1 + 0.07)^{10} - 1}$$

The quantities in brackets should be multiplied so as to raise the product to the tenth power. When it is necessary to raise the power to 20, 30 or more, one can realize the amount of figuring required. The final result of the above equation is  $r = 14.24$  cents a year. The same result may be obtained at once by dividing \$1.00 by the factor given in the table, namely, 7.02.

If an untreated tie costs 50 cents delivered at the treating plant, 25 cents is spent for treating it and 20 cents for distributing and placing it in track, or a total cost of 95 cents ( $C$ ), and if it lasts 15 years, the annual charge at 7 per cent. interest would be ascertained by dividing 95 cents by 9.10 (from the table) and the quotient ( $r$ ) would be 10.44 cents a year.

After determining the annual maintenance cost of the two items that are to be compared, their difference should be multiplied by the mean number of years. For example, taking the two cases above mentioned we get the following result:

Annual charge for untreated tie.....	\$ .1424
Annual charge for treated tie.....	.1044
Difference per year.....	\$ .0380

Multiplying .0380 by the mean number of years, which in this case is 12.5, the product is 47.5 cents in favor of the treated tie.

### TELEGRAPH AND TELEPHONE POLES

The relative economy between treated and untreated telegraph poles can be ascertained in the same manner. For example, if a 35-ft., 7-in. top, cedar pole costs \$6, setting up costs \$5, and it lasts 12 years, while a pine, chestnut or oak pole of the same size costs \$4.50, treating the butt with creosote costs \$2, and setting up, \$5, and it lasts 20 years, with interest at 6 per cent in both cases, the comparison would be as follows:

Cedar pole.—\$11.00 divided by 8.38 = \$1.31 a year.

Treated pine, chestnut or oak pole.—\$11.50 divided by 11.47 = \$1.00 a year.

The difference in favor of the treated pole is 31 cents a year. Multiplying this by the mean life, which in this case is 16 years, gives \$4.96 in favor of each treated pole. The larger the poles the greater is the percentage of economy. Some people treat the whole pole, but most people treat only eight feet of the butt in open tanks and that is generally considered sufficient for cedar and chestnut poles.

### FENCE POSTS

In like manner the relative economy between wooden, concrete and steel posts may be ascertained. For example, assume that a 5-in. top, 8-ft., cedar post costs 18 cents delivered, the setting costs 4 cents, and it lasts 16 years, also that a concrete post 4 in. by 5 in. by 8 ft., costs 35 cents delivered, the setting costs 6 cents and it lasts 25 years, with interest in both cases at 6 per cent., the following comparison is obtained:

Cedar post.—\$0.22 divided by 10.11 = \$0.0217 a year.

Concrete post.—\$0.41 divided by 12.78 = \$0.0321 a year.

The difference in favor of the wooden post equals \$0.014 a year. Multiplying this by the mean number of years, which in this case is 20½ years, gives \$.213 in favor of the wooden posts.

Now, supposing the above wooden cedar posts were given a preservative treatment at a cost of 6 cents each and the life was thereby increased 10 years, the relative economy would be found by dividing \$0.28 by 13.00 which equals \$0.0214 a year, practically the same as for the untreated post. The economy in treating fence posts is not so pronounced as with ties and poles, for the reason that fence posts are a cheaper class of material than ties and poles, besides the cost of setting or placing is much less and owing to the conditions of service they have comparatively much longer life. Treated fence posts, however, show an economy over steel or concrete posts.

DISCOUNTED PRESENT VALUE OF AN ANNUAL RETURN OF 1, OBTAINABLE FOR  $N$  YEARS AT VARIOUS RATES OF INTEREST

Years $n$	Rate of interest ( $p$ ) per cent			
	4	5	6	7
1.....	0.96	0.95	0.94	0.93
2.....	1.89	1.86	1.83	1.81
3.....	2.78	2.72	2.67	2.63
4.....	3.63	3.54	3.46	3.39
5.....	4.45	4.33	4.21	4.09
6.....	5.24	5.08	4.91	4.76
7.....	6.00	5.79	5.57	5.39
8.....	6.73	6.46	6.20	5.96
9.....	7.43	7.11	6.80	6.51
10.....	8.11	7.72	7.36	7.02
11.....	8.76	8.31	7.88	7.49
12.....	9.38	8.86	8.38	7.94
13.....	9.98	9.39	8.85	8.35
14.....	10.56	9.90	9.29	8.74
15.....	11.12	10.38	9.71	9.10
16.....	11.65	10.84	10.11	9.44
17.....	12.16	11.27	10.48	9.76
18.....	12.66	11.69	10.83	10.05
19.....	13.13	12.08	11.16	10.33
20.....	13.59	12.46	11.47	10.59
21.....	14.03	12.82	11.76	10.83
22.....	14.45	13.16	12.04	11.06
23.....	14.86	13.49	12.30	11.27
24.....	15.25	13.80	12.55	11.47
25.....	15.62	14.09	12.78	11.65
26.....	15.98	14.37	13.00	11.82
27.....	16.33	14.64	13.21	11.98
28.....	16.66	14.90	13.41	12.13
29.....	16.98	15.14	13.59	12.27
30.....	17.29	15.37	13.76	12.40
35.....	18.66	16.37	14.47	12.93
40.....	19.79	17.16	15.04	13.33
45.....	20.72	17.77	15.45	13.60
50.....	21.48	18.26	15.76	13.80
55.....	22.11	18.63	15.99	13.94

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RAILWAY LINES NEAR THE TRENCHES.—Many of the railway lines between France and Belgium intersect the trenches, and regular trains cannot be run in those localities; but the Germans have utilized these lines by bringing in cars operated by storage batteries and operating them singly to remove the wounded from the battle front, and to bring back supplies.

# General News Department

The roundhouse, machine shops, car shops and a large part of the rolling stock of the Alaska Northern Railway (the government-owned road) at Seward, Alaska, were destroyed by fire on May 10.

For the purpose of interesting school boys along its line in railroad work, the St. Louis & San Francisco has arranged a plan to have its division superintendents and other officers give short talks on the different branches of railroad service at schools at points on their divisions or other places when opportunity is offered.

Prominent railroad officers in California are proposing to test the constitutionality of the law of that state which requires railroads, street railways and steamship companies to carry without charge the members of the State Public Utilities Commission and its employees. In the recent decision of the United States Supreme Court in the case of the Northern Pacific against the state of North Dakota it was said that a carrier cannot be required to carry persons or goods gratuitously; and that this principle holds even if it be claimed that the public interests demands such free transportation. In California these officers of the state ride free on the railroads many hundred miles when they are engaged in business not connected with transportation, such as the inspection of light, power and water plants. The street railways of San Francisco carry large numbers of state employees free, and the free tickets are said often to find their way into the hands of persons not entitled to use them.

## American Railway Association

The spring session of The American Railway Association was held at The Biltmore, New York City, on Wednesday of this week, President H. U. Mudge in the chair and 250 members being represented by 180 delegates.

The executive committee reported that a special committee (Julius Kruttschnitt, chairman), appointed to confer with the statistician of the Interstate Commerce Commission on a proposed revision of the rules governing the monthly reports of railway accidents, had arranged to have the effective date of the revision postponed until the railways have had a further opportunity to consider it. The special committee has also submitted one accident blank in place of six as proposed, which blank can be used by the railways in making reports to the several state and Public Service Commissions, as well as to the federal body, and also proposed a revised draft of the instructions.

The Committee on Maintenance, which has been examining the clearances for switch-stands, signal-stands, platforms, platform-shelters, mail-cranes, water-columns, coal-chutes and water tanks, has collected from the members of the association much data, and has reported that the subject is receiving attention by the American Railway Engineering Association. The committee included in its report a summary of replies to circular No. 1511, respecting the number of freight cars, passenger cars and locomotives equipped with safety appliances as required by the United States Safety Appliance Standards, as of January 1, 1915. On that date the number of freight cars in service (413 roads reporting) was 2,556,443, number fully equipped, 1,469,111; an increase of 398,358 over January 1, 1914. All cars in service, both freight and passenger, are fully equipped with grabirons as required by the laws of 1893, 1896 and 1903.

The Committee on Transportation reported that the revision of the train rules is substantially completed, but it will not present the revised code to the association for adoption until the fall session, by which time a revision of the block signal and interlocking rules will probably be ready.

The Committee on Transportation of Explosives presented the eighth annual report of the chief inspector of the bureau of explosives. (Noticed in the *Railway Age Gazette* of April 9.) On the recommendation of the committee, the association's rule, No. 1302, concerning the shipment of dangerous articles in bag-

gage cars, was amended so as to provide that such shipments must be packed, marked and labeled as prescribed for express shipments and must not be transported in that part of any car used for the transportation of passengers.

The committee also called attention to the need of securing a revision of Section 233 of the United States Penal Code, so as to cover the transportation of "Other Dangerous Articles." A resolution was adopted by the association favoring the passage of such a revision.

The Committee on Legal and Traffic Relations reported that under instructions of the association it had undertaken the representation of the American Railway Association and individually of 158 railways, representing 190,871 miles, in the Interstate Commerce Commission's investigation of embargoes.

The Committee on Relations Between Railroads reported that Messrs. G. E. Evans (L. & N.) and J. J. Bernet (N. Y. C.) have been elected members of the committee, to fill vacancies.

On recommendation of the committee, the association adopted resolutions urging the more general use of interline billing of freight, the better enforcement of rules for packing and marking of merchandise, that all roads enforce more careful handling of freight and that the several subordinate associations co-operate in these activities to the end of reducing claims for loss of and damage to freight, payments on this account having amounted in the last fiscal year to over thirty-six millions of dollars.

This committee reported, and the association adopted, some revisions of the rules for weighing empty cars and amendments to per diem rule 1 and car service rules 3, 14 and 15.

The meeting approved new car service rules 18, 19 and 20, covering (a) the continuous home route card; (b) cars containing refuse, which must not be offered in interchange, and (c) allowing a receiving road to collect \$2 for weighing carloads of freight received from connections not weighed. Revisions of demurrage rules were also adopted.

The election resulted in the choice of A. W. Thompson (B. & O.) as second vice-president, and T. E. Clarke (D. L. & W.) and A. H. Smith (N. Y. C.) as members of the Executive Committee.

The following were elected members of the Committee on Transportation: Boston & Maine; Hocking Valley; Pennsylvania lines west of Pittsburgh.

The following were elected members of the Committee on Maintenance: Atchison, Topeka & Santa Fe; Norfolk & Western; Pennsylvania lines west of Pittsburgh.

The following were elected members of the Committee on Relations Between Railroads: Louisville & Nashville; New York Central; Southern. Chicago was selected as the place for the next regular session, which will be held on November 17.

## Report of Special Committee

The Special Committee on Relations of Railway Operation to Legislation has issued its report, No. 14, outlining the progress of its work since the last report submitted on November 3, 1914. The report states that the only bill relating to railway operation which was passed during the Congress which adjourned on March 4, was that extending the provisions of the locomotive boiler inspection act to all parts of the locomotive and tender. Since the first of January legislatures in 43 states have been in session. Of these 31 have adjourned. Up to May 1, there had been introduced 1,005 bills relating to railway operation, of which 51 related to the number of men to be employed in train or switch crews, none of which have been passed. A total of 94 bills have become laws, most of which deal with relatively unimportant features of railway operation.

The report says that it is not impossible that when the next Congress meets an effort will be made to secure legislation specifying standard horizontal and vertical clearances. In view of the fact that there is not a standard clearance for new construction recommended either by the American Railway Engineering



Association or the American Railway Association, a sub-committee of engineering officers will take this matter vigorously in hand with the proper committee of the American Railway Engineering Association, and it is hoped that the latter committee will be able to submit a report by the first of December. The report also mentions the bulletin on the progress of the construction of steel and steel underframe passenger cars, and says that inasmuch as the construction of wooden cars for passenger service has practically been discontinued, it appears that no necessity exists for legislation on this subject from any point of view.

#### Revenues and Expenses of Express Companies for January

The following statement, which is subject to revision, has been compiled by the Interstate Commerce Commission from the monthly reports of operating revenues and expenses of the principal express companies for January, 1915. (The express companies have three months in which to make reports.)

A.—FOR THE MONTH OF JANUARY										
Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Mileage of all lines covered (miles).....	44,883.11	38,665.94	72,192.66	59,792.88	9,676.50	7,080.31	2,839.78	2,839.78	9,557.73	9,336.44
Charges for transportation.....	\$2,347,856	\$2,361,889	\$3,111,765	\$2,828,022	\$187,176	\$186,730	\$39,720	\$35,110	\$191,371	\$205,103
Express privileges—Dr. ....	1,196,717	1,261,317	1,518,718	1,510,649	92,816	94,593	20,667	18,079	120,531	124,560
Operations other than transportation	33,448	25,403	153,893	166,932	4,429	7,973	679	600	3,316	3,373
Total operating revenues.....	1,184,587	1,125,975	1,746,941	1,484,305	98,788	100,110	19,732	17,632	74,156	83,915
Operating expenses.....	1,415,147	1,296,532	1,854,299	1,859,540	115,638	128,095	28,066	28,175	101,861	86,846
Net operating revenue.....	—230,560	—170,556	—107,358	—375,235	—16,849	—27,985	—8,333	—10,543	—27,704	—2,930
Uncollectible revenue from transp'n.	528	.....	247	90	.....	.....	.....	.....	6	.....
Express taxes.....	17,210	18,132	33,240	32,253	4,000	2,850	800	1,000	3,855	3,772
Operating income.....	—248,299	—188,688	—140,846	—407,576	—20,849	—30,835	—9,133	—11,543	—31,566	—6,703

B.—FOR THE SEVEN MONTHS ENDING WITH JANUARY										
Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Mileage of all lines covered (miles).....	8,118.34	8,080.40	34,552.60	33,615.60	113,461.05	99,680.19	5,174.26	5,008.97	300,456.03	296,385.34
Charges for transportation.....	\$165,487	\$176,089	\$1,037,130	\$1,312,786	\$2,596,555	\$2,182,234	\$77,578	\$78,133	\$9,754,641	\$10,788,573
Express privileges—Dr. ....	95,376	98,389	554,384	690,555	1,351,618	1,125,676	40,485	44,029	4,991,315	5,573,887
Operations other than transportation	2,460	2,601	21,213	24,803	48,222	44,477	2,756	2,035	270,420	302,117
Total operating revenues.....	72,571	80,301	503,959	647,034	1,293,159	1,101,035	39,849	36,140	5,033,746	5,516,803
Operating expenses.....	80,134	84,541	498,489	565,927	1,362,882	1,140,424	47,109	47,229	5,503,629	6,058,571
Net operating revenue.....	—7,562	—4,239	5,469	81,106	—69,722	—39,389	—7,259	—11,088	—469,883	—541,768
Uncollectible revenue from transp'n.	25	6	34	.....	775	.....	1	.....	1,620	97
Express taxes.....	5,000	4,500	14,667	14,565	32,891	33,000	953	722	112,618	124,543
Operating income.....	—12,588	—8,746	—9,232	66,540	—103,389	—72,389	—8,214	—11,811	—584,121	—666,408

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Charges for transportation.....	\$20,081,460	\$20,634,267	\$27,089,551	\$25,397,427	\$1,897,338	\$1,976,553	\$438,599	\$428,799	\$1,923,689	\$2,050,962
Express privileges—Dr. ....	10,326,949	10,927,894	13,557,123	12,716,614	962,871	941,963	220,594	215,602	1,171,786	1,245,700
Operations other than transportation	292,151	221,670	1,233,005	1,304,638	35,857	65,853	5,792	6,018	31,657	30,876
Total operating revenues.....	10,046,661	9,928,043	14,765,433	13,985,451	970,324	1,100,443	223,798	219,215	783,560	836,139
Operating expenses.....	10,810,648	10,004,468	14,723,782	13,811,360	928,272	1,021,195	206,920	215,621	642,039	641,562
Net operating revenue.....	—763,986	—76,425	41,650	174,090	42,051	79,247	16,878	3,594	141,521	194,576
Uncollectible revenue from transp'n.	3,267	1,191	158	.....	.....	.....	.....	.....	11	.....
Express taxes.....	119,454	116,743	246,351	213,335	28,000	19,850	7,400	8,200	28,472	28,606
Operating income.....	—886,708	—193,168	—205,892	—39,403	14,051	59,397	9,478	—4,605	113,037	165,970

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Charges for transportation.....	\$1,687,350	\$1,892,603	\$8,018,982	\$9,367,507	\$22,177,418	\$19,076,828	\$693,863	\$747,212	\$84,008,254	\$93,794,196
Express privileges—Dr. ....	917,813	1,023,825	4,110,405	4,786,018	11,357,041	9,554,600	371,647	418,508	42,996,233	47,837,520
Operations other than transportation	23,497	23,880	179,620	198,522	421,633	388,681	21,824	17,187	2,245,040	2,441,413
Total operating revenues.....	793,034	892,557	4,088,197	4,780,011	11,242,010	9,910,910	344,040	345,891	43,257,061	48,398,089
Operating expenses.....	634,628	658,209	3,708,906	4,094,568	10,571,523	8,806,818	372,325	356,626	42,599,047	45,861,937
Net operating revenue.....	158,406	234,348	379,290	685,443	670,487	1,104,091	—28,284	10,734	658,014	2,536,152
Uncollectible revenue from transp'n.	100	25	264	84	6,084	.....	54	.....	10,975	268
Express taxes.....	35,000	31,500	102,922	104,848	254,033	228,000	7,137	5,351	825,771	832,428
Operating income.....	123,306	202,822	276,103	580,510	410,369	876,091	—35,476	—16,026	—181,732	1,703,456

\*Includes previous year's returns of United States Express Co.

#### Fuel Association Exhibitors

The following railway supply concerns had exhibits at the International Railway Fuel Association convention, which was held at Chicago this week. An abstract of the proceedings of the professional sessions of this association will be found elsewhere in this issue.

American Arch Company, New York.—Security arch. Represented by Guy Bean, W. L. Allison, F. G. Boomer, G. C. Denney, J. T. Anthony, J. P. Neff, H. D. Savage, LeGrand Parish and John L. Nicholson.  
 Barco Brass & Joint Co., Chicago.—Barco metallic engine and tender air and steam heat connections. Represented by F. N. Bard and C. L. Mellor.  
 Casey-Hedges Company, Chattanooga, Tenn.—Hawkes boiler and Casey-Hedges horizontal water tube. Represented by C. W. Hawkes and Henry Vick.  
 Economy Devices Company, New York.—Woodward truck, radial buffer and Economy exhaust nozzle. Represented by J. L. Randolph.  
 Fairbanks, Morse & Co., Chicago.—Photographs of coaling stations, mine tipples and ground storage. Represented by J. C. Flannigan.

Franklin Railway Supply Company, New York.—Franklin fire door. Represented by C. W. F. Coffin, Jos. Sinkler, Ralph Coburn and Sam Rosenfelt.  
 Goodman Manufacturing Company, Chicago.—Photographs of coal mining machinery and electric mine locomotives. Represented by H. H. Small and A. F. Fors.  
 Heat Saver Company, Chicago.—Blaske fuel saving devices. Represented by G. A. Smith and R. L. Holmes.  
 Hulson Grate Company, Keokuk, Iowa.—Hulson locomotive grate. Represented by A. W. Hulson.  
 Industrial Instrument Company, Foxboro, Mass.—Pyrometers, gages, thermometers, tachometers, temperature controllers and steam flow meters. Represented by F. W. Carret.  
 Jeffrey Manufacturing Company, Columbus, Ohio.—Photographs of single roll coal pressure, Arcwall mining machine and electric mine locomotives. Represented by W. J. Armstrong, P. C. Dierdorff, S. S. Shive and C. C. Ford.  
 Link Belt Company, Chicago.—Photographs of coaling stations and stations for storage of coal. Represented by J. C. Neligan.  
 Locomotive Stoker Company, New York.  
 Locomotive Superheater Company, New York.—Photographs of superheater and pyrometer. Represented by Geo. Fogg, Wm. Boughton, J. Mounie, R. R. Porterfield, Gilbert Ryder and G. Spangler.

Manistee Iron Works Company, Manistee, Mich.—Centrifugal pumps and traveling grate stokers. Represented by Henry Vick.  
 Manning, Maxwell & Moore, Inc., New York.—Hancock inspirators, Ashcroft gages and boiler fittings. Represented by C. L. Brown and F. J. Wilson.  
 National Graphite Lubricator Company, Chicago.—Lubricators. Represented by E. L. Pollock.  
 National Railway Devices Company, Chicago.—Shoemaker fire door. Represented by J. G. Robinson, E. J. Gunnison and V. W. Goodman.  
 Ogle Construction Company, Chicago.—Working model of coal handling plant. Represented by C. F. Bledsoe, M. W. Powell and R. A. Ogle.  
 Parsons Engineering Company, Wilmington, Del.—Photographs of smoke prevention equipment. Represented by Wm. H. Savery.  
 Pyle-National Electric Headlight Company, Chicago.—Pyle-National headlights. Represented by L. H. Steger, Wm. Miller and R. L. Eddy.  
 Q. & C. Company, New York.—Ross-Schofield boiler circulator. Represented by C. F. Pierce, C. M. Jewell, J. J. Daly and E. R. Packer.  
 Roberts & Schaefer Company, Chicago.—Photographs of coal and sand handling devices. Represented by C. P. Ross.

Simonds & Co., G. L., Chicago.—Dean ash tube cleaner, Vulcan soot cleaner, Hays gas analyzers and draft gages. Represented by F. A. Moreland, G. L. Simonds and A. B. Nelson.

Snow Construction Company, T. W., Chicago.—Photographs of coal and water stations. Represented by T. W. Snow and R. E. Robinson.

Stroud & Co., E. H., Chicago.—Stroud powdered coal burner and Stroud air separation coal pulverizer. Represented by E. H. Stroud.

United States Graphite Company, Saginaw, Mich.—Mexican boiler graphite, Mexican lubricating graphite and locomotive graphite feeder. Represented by J. G. Draught and J. W. Eviston.

Whiting-Evans Manufacturing Company, Chicago.—Kerosene carburetor and stationary engines. Represented by H. Q. Turner.

### American Electric Railway Association

The annual convention of the American Electric Railway Association and the American Electric Railway Manufacturers' Association will be held in San Francisco, October 4 to 8.

The transportation committee has made tentative arrangements for special transportation facilities for the association members as follows:

The Red Special on Tour "A" will leave New York about September 23, and stop for passengers at Albany, Utica, Syracuse, Rochester, Buffalo and Cleveland. From Chicago it will go to St. Paul and Minneapolis, and thence over the Great Northern to Glacier Park, whence after a stopover of a day and a night it will proceed through Spokane, Seattle, Tacoma and Portland. After a day in Portland the train will leave over the Shasta Route and arrive at San Francisco on October 2.

Returning after a week's stay in San Francisco the train will proceed to Yosemite National Park, where a stop of two days will be made and thence to Los Angeles and Pasadena, where another two days' stop will be made. A two days' stop will also be made at the San Diego Exposition and the Coronado

### Summary of Revenues and Expenses of Large Steam Roads

The following figures were compiled by the Interstate Commerce Commission from monthly reports of operating revenues and expenses of large steam roads for the month of March, 1915. No reports are included for roads whose operating revenues for the year ended June 30, 1914, did not reach \$1,000,000. The figures are compiled as rendered and should not be considered final, inasmuch as scrutiny of the reports may lead to their modification before acceptance.

Item	United States			Eastern District			Southern District			Western District		
	Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated	
	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*
Average number of miles operated	228,660.64	...	...	58,820.77	...	...	42,348.25	...	...	127,491.62	...	...
Revenues:												
Freight .....	\$163,597,589	\$715	\$777	\$72,703,100	\$1,236	\$1,326	\$27,190,042	\$642	\$723	\$63,704,447	\$500	\$539
Passenger .....	46,436,626	203	218	19,652,775	334	348	6,678,513	158	187	20,105,338	158	168
Mail .....	4,746,255	21		1,725,993	29		626,111	15	15	2,394,151	19	17
Express .....	5,266,225	23	75	2,252,126	38	132	790,274	19	23	2,223,825	17	16
All other transportation .....	6,652,213	29		3,713,869	63		603,804	14	15	2,334,540	18	22
Incidental .....	4,636,449	20	21	2,278,831	39	41	662,815	15	17	1,694,803	13	13
Joint Facility—Cr. ....	261,020	1	1	119,416	2	2	56,582	1	1	85,022	1	1
Joint Facility—Dr. ....	-97,251	...	...	-61,941	...	...	-12,846	...	...	-22,464	...	...
Railway operating revenues .....	\$231,499,126	\$1,012	\$1,092	\$102,384,169	\$1,741	\$1,849	\$36,595,295	\$864	\$981	\$92,519,662	\$726	\$776
Expenses:												
Maint. of way and structures .....	\$26,098,580	\$114	\$126	\$11,048,634	\$188	\$314	\$4,786,332	\$113	\$117	\$10,263,614	\$81	\$88
Maintenance of equipment .....	41,747,323	182	196	20,139,338	342	362	6,626,032	156	182	14,981,953	118	123
Traffic .....	4,932,870	22	22	1,848,203	32	31	888,432	21	22	2,196,235	17	17
Transportation .....	84,294,244	369	419	39,290,673	668	770	12,343,213	292	342	32,660,358	256	282
Miscellaneous operations .....	1,825,297	8	11	821,376	14	22	196,812	5	5	807,109	6	7
General .....	6,278,579	27	29	2,719,432	46	49	983,666	23	25	2,575,481	20	21
Transportat'n for Investm't—Cr. ....	-444,991	-2	-1	-65,411	-1	...	-94,511	-2	...	-285,069	-2	-1
Railway operating expenses .....	\$164,731,902	\$720	\$802	\$75,802,245	\$1,289	\$1,448	\$25,729,976	\$608	\$693	\$63,199,681	\$496	\$537
Net revenue from railway operations .....	\$66,767,224	\$292	\$290	\$26,581,924	\$452	\$401	\$10,865,319	\$256	\$288	\$29,319,981	\$230	\$239
Railway tax accruals .....	\$11,133,218	\$49	\$50	\$4,714,075	\$80	\$80	\$1,565,001	\$37	\$39	\$4,854,142	\$38	\$40
Uncollectible railway revenues .....	52,884	...	...	13,333	...	...	10,086	...	...	29,465	...	...
Railway operating income .....	\$55,581,122	\$243	\$240	\$21,854,516	\$372	\$321	\$9,290,232	\$219	\$249	\$24,436,374	\$192	\$199

\*Because of changes in accounting classifications, consolidations of companies, etc., comparative averages are approximate only.

Item	FOR THE NINE MONTHS ENDING WITH MARCH											
	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*
	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*
Average number of miles operated	228,363.67	...	...	58,758.72	...	...	42,302.34	...	...	127,302.61	...	...
Revenues:												
Freight .....	\$1,492,172,408	\$6,534	\$7,054	\$645,524,309	\$10,986	\$11,894	\$228,311,491	\$5,397	\$6,083	\$618,336,608	\$4,857	\$5,114
Passenger .....	477,090,639	2,089	2,318	209,049,800	3,557	3,816	65,912,401	1,558	1,816	202,128,438	1,588	1,785
Mail .....	42,826,776	188		15,579,918	265		5,642,947	133	133	21,603,911	170	155
Express .....	51,029,417	223	727	22,787,929	388	1,336	7,671,029	182	208	20,570,159	162	175
All other transportation .....	61,984,945	271		34,325,907	584		5,010,698	119	135	22,648,340	178	196
Incidental .....	43,710,756	192	205	22,670,349	386	399	5,458,511	129	144	15,581,896	122	134
Joint Facility—Cr. ....	2,633,455	12	12	1,183,333	20	19	519,347	12	12	930,775	7	8
Joint Facility—Dr. ....	-930,133	-4	-4	-585,750	-10	-8	-115,852	-3	-2	-228,531	-2	-2
Railway operating revenues .....	\$2,170,518,263	\$9,505	\$10,312	\$950,535,795	\$16,176	\$17,456	\$318,410,572	\$7,527	\$8,529	\$901,571,896	\$7,082	\$7,565
Expenses:												
Maint. of way and structures .....	\$266,153,708	\$1,165	\$1,337	\$112,717,911	\$1,918	\$2,274	\$43,391,639	\$1,026	\$1,119	\$110,044,158	\$864	\$972
Maintenance of equipment .....	377,738,545	1,654	1,794	177,873,006	3,027	3,323	61,455,810	1,453	1,601	138,409,729	1,087	1,143
Traffic .....	44,463,837	195	209	16,940,642	288	317	8,331,414	197	201	19,191,781	151	162
Transportation .....	776,709,984	3,401	3,761	360,525,041	6,136	6,859	111,650,189	2,639	2,955	304,534,754	2,392	2,580
Miscellaneous operations .....	17,245,512	76	97	8,122,155	138	189	1,660,717	39	44	7,462,640	59	72
General .....	55,432,432	243	251	23,564,313	401	406	8,911,253	210	220	22,956,866	180	189
Transportat'n for Investm't—Cr. ....	-4,933,955	-22	-10	-550,324	-9	...	-1,030,297	-24	-3	-3,353,334	-26	-18
Railway operating expenses .....	\$1,532,810,063	\$6,712	\$7,439	\$699,192,744	\$11,899	\$13,368	\$234,370,725	\$5,540	\$6,137	\$599,246,594	\$4,707	\$5,100
Net revenue from railway operations .....	\$637,708,200	\$2,793	\$2,873	\$251,343,051	\$4,277	\$4,088	\$84,039,847	\$1,987	\$2,392	\$302,325,302	\$2,375	\$2,465
Railway tax accruals .....	\$100,198,118	\$439	\$449	\$41,296,373	\$703	\$719	\$13,985,376	\$331	\$337	\$44,916,369	\$353	\$360
Uncollectible railway revenues .....	398,339	2	...	138,828	2	...	69,343	2	...	190,168	1	...
Railway operating income .....	\$537,111,743	\$2,352	\$2,424	\$209,907,850	\$3,572	\$3,369	\$69,985,128	\$1,654	\$2,055	\$257,218,765	\$2,021	\$2,105

\*Because of changes in accounting classifications, consolidations of companies, etc., comparative averages are approximate only.



Beach Hotel. The train will also make a stop of a few hours at Riverside, a day's stop at the Grand Canyon, and after a short stop at Albuquerque will proceed via Kansas City and Chicago to New York.

The Blue Special on Tour "B" will leave New York over the Pennsylvania about September 26, and will stop to receive passengers at Newark, Philadelphia, Harrisburg, Pittsburgh, Columbus, Indianapolis, St. Louis and Kansas City, thence proceeding to Denver, Colorado Springs and through the Royal Gorge. It will stop at Glenwood Springs, and then go on to Salt Lake and Ogden and Lake Tahoe, arriving at San Francisco October 3. Returning it will follow the same route as the Red Special.

The White Special on Tour "C" will be a faster train. It will leave Chicago in time to arrive at San Francisco October 4, and will be for the going trip only.

#### Association of Railway Claim Agents

The twenty-sixth annual convention of the Association of Railway Claim Agents was held at Galveston, Tex., on April 13, 14 and 15. The following officers were elected for the ensuing year: President, H. B. Hull, chief claim agent, Illinois Central, Chicago; vice-presidents, W. F. Every, general claim agent, Northern Pacific, St. Paul, and A. H. Mansfield, claims attorney, Missouri Pacific, St. Louis; secretary and treasurer, Willis H. Failing, of New York City. It was decided to hold the next convention at Atlantic City.

#### American Society of Mechanical Engineers

The Chicago section of the American Society of Mechanical Engineers, held its last 1914-15 seasonal meeting May 14, 1915, at the La Salle Hotel, Chicago. An interesting paper on Electric Locomotives was presented by A. F. Batchelder and A. H. Armstrong of the General Electric Company, Schenectady, N. Y. The following officers were nominated for the following year: H. M. Montgomery, chairman; Joseph Harrington, vice-chairman; Robert E. Thayer, secretary, and H. T. Bentley and C. E. Wilson as other members of the executive committee.

#### Western Railway Club

The annual meeting and election of officers of the Western Railway Club will be held at the Hotel La Salle, Chicago, on Tuesday evening, May 25, at 8 p. m. The program for the evening is as follows: Address of Dean W. F. M. Goss, of the College of Engineering and Engineering Experiment Station of the University of Illinois; Reports of officers; Election of officers; Address of retiring president; Entertainment.

#### Special Agents and Police

The International Association of Railway Special Agents and Police will hold its nineteenth annual convention at the Grand Hotel, Cincinnati, Ohio, May 25, 26, 27 and 28. The secretary of the association is W. C. Pannell, who is also editor of the association's quarterly magazine, Baltimore, Md.

### MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.

AMERICAN RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreuccetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday in month, Pittsburgh.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Stated meeting, May 26-27, 1915, Hotel Astor, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, July 15, 1915, Atlanta. Annual meeting, January, 1916.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November, Noonday meetings, October to May.

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meetings, 2d Monday in June.

TRAIN DISPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting, June 15, 1915, Minneapolis, Minn.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday-afternoon in month, except June, July and August, La Salle Hotel, Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meetings, 1st Wednesday after 1st Thursday in January, Chicago.

## REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MARCH, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses			Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.
		Freight.	Passenger.	Total.	Way and structures.	Maintenance of equipment.	Trans- portation.				
		inc. misc.						Total.	General.	Miscellaneous.	
Baltimore & Ohio Chicago Terminal.....	80	\$587,013	\$1,096,361	\$1,773,374	\$221,428	\$216,969	\$909,368	\$12,561	\$1,481,428	\$121,500	\$19,253
Baltimore & Ohio Chicago Terminal.....	80	5,192	1,779,346	1,784,538	102,265	166,764	507,040	40,638	836,667	169,823	17,274
Baltimore & Ohio Chicago Terminal.....	631	2,188,291	483,890	2,672,181	2,822,812	441,490	841,170	86,187	1,005,812	90,847	56,558
Baltimore & Ohio Chicago Terminal.....	24	.....	2,462,905	2,462,905	130,061	228,503	7,705	54,760	1,304,611	90,135	297,706
Baltimore & Ohio Chicago Terminal.....	204	5,570,160	296,127	5,866,287	509,139	1,404,278	91,874	105,230	3,508,485	165,019	707,335
Baltimore & Ohio Chicago Terminal.....	27	844,767	881,053	1,725,820	117,217	110,017	162,383	16,527	381,326	18,627	322,447
Baltimore & Ohio Chicago Terminal.....	44	356,675	8,018	364,693	128,213	110,017	4,654	31,749	111,998	22,946	146,442
Baltimore & Ohio Chicago Terminal.....	2,302	19,975,843	11,750,404	31,726,247	5,209,869	5,293,538	15,394,218	893,755	27,265,935	6,226,145	984,232
Baltimore & Ohio Chicago Terminal.....	91	118,638	59,147	177,785	40,401	69,888	10,389	44,428	243,753	14,400	27,664
Baltimore & Ohio Chicago Terminal.....	253	1,018,446	61,181	1,079,627	205,934	345,722	11,663	48,957	945,389	23,400	130,471
Baltimore & Ohio Chicago Terminal.....	586	6,005,750	849,429	6,855,179	918,635	1,638,197	109,156	165,197	5,245,840	180,000	586,708
Baltimore & Ohio Chicago Terminal.....	233	754,703	180,421	935,124	172,407	161,207	51,778	32,370	858,784	142,640	148,063
Baltimore & Ohio Chicago Terminal.....	248	1,433,912	132,188	1,566,100	168,880	208,106	57,793	83,582	826,691	128,250	648,237
Baltimore & Ohio Chicago Terminal.....	18	84,298	99,847	184,145	10,231	762	18,787	5,968	50,878	6,750	27,625
Baltimore & Ohio Chicago Terminal.....	1,924	6,152,632	2,310,327	8,462,959	1,265,451	1,739,926	303,839	309,619	6,893,279	423,232	590,582
Baltimore & Ohio Chicago Terminal.....	678	15,476,788	4,429,228	19,906,016	1,801,350	3,947,628	271,513	417,223	14,050,245	1,078,406	5,958,319
Baltimore & Ohio Chicago Terminal.....	304	2,373,188	351,707	2,724,895	367,217	308,391	1,118	34,148	1,878,766	111,000	870,194
Baltimore & Ohio Chicago Terminal.....	411	1,969,546	673,046	2,642,592	368,592	485,337	7,454	91,116	2,559,722	141,840	357,059
Baltimore & Ohio Chicago Terminal.....	341	1,029,413	244,123	1,273,536	263,222	285,162	33,297	36,521	1,071,728	45,000	118,616
Baltimore & Ohio Chicago Terminal.....	2,372	22,704,335	4,303,563	27,007,898	3,260,266	6,097,128	489,968	646,559	20,824,347	1,004,559	744,317
Baltimore & Ohio Chicago Terminal.....	1,033	6,991,134	2,934,548	9,925,682	1,229,777	2,488,624	332,317	271,571	8,421,274	403,393	2,004,217
Baltimore & Ohio Chicago Terminal.....	1,282	8,077,365	2,119,641	10,197,006	1,315,867	2,304,621	214,824	329,203	8,405,415	475,200	1,835,572
Baltimore & Ohio Chicago Terminal.....	270	3,655,373	434,896	4,090,269	592,675	829,675	170,598	115,778	3,309,238	141,493	1,054,828
Baltimore & Ohio Chicago Terminal.....	8,108	39,911,787	15,642,152	55,553,939	7,904,738	9,830,094	1,003,128	1,118,882	43,147,949	3,375,000	15,262,623
Baltimore & Ohio Chicago Terminal.....	9,367	48,537,998	15,446,985	63,984,983	6,913,146	11,935,854	1,217,362	1,570,203	44,755,519	2,957,186	7,966,340
Baltimore & Ohio Chicago Terminal.....	60	489,494	130,930	620,424	89,664	109,383	14,911	12,931	615,230	25,830	79,523
Baltimore & Ohio Chicago Terminal.....	1,429	7,385,556	2,346,948	9,732,504	1,325,670	1,829,868	192,089	308,771	7,889,294	274,084	456,988
Baltimore & Ohio Chicago Terminal.....	618	3,729,076	1,277,834	5,006,910	860,720	1,161,050	1,150	154,037	3,590,252	1,34,081	200,455
Baltimore & Ohio Chicago Terminal.....	10,071	48,653,378	13,675,320	62,328,698	7,713,393	10,143,221	1,326,539	1,362,458	47,555,936	3,609,920	1,105,743
Baltimore & Ohio Chicago Terminal.....	255	1,685,321	186,541	1,871,862	179,988	204,646	47,645	41,872	1,613,332	154,194	157,162
Baltimore & Ohio Chicago Terminal.....	477	1,685,612	453,164	2,138,776	261,385	322,750	87,651	1,602	1,558,995	652,743	582,911
Baltimore & Ohio Chicago Terminal.....	7,852	35,407,085	13,434,537	48,841,622	6,926,996	8,320,163	1,322,397	1,250,325	39,355,220	2,414,847	10,470,471
Baltimore & Ohio Chicago Terminal.....	1,753	9,037,681	3,820,151	12,857,832	1,489,219	1,870,410	257,779	324,394	9,322,127	4,533,209	780,800
Baltimore & Ohio Chicago Terminal.....	372	1,519,468	147,149	1,666,617	220,712	398,211	31,992	89,164	1,278,101	434,714	327,214
Baltimore & Ohio Chicago Terminal.....	1,003	5,295,872	1,136,853	6,432,725	1,080,801	1,528,942	172,278	6,251,742	6,251,742	326,533	186,292
Baltimore & Ohio Chicago Terminal.....	337	5,307,086	1,334,732	6,641,818	697,411	1,814,151	228,947	183,016	5,223,573	1,824,287	1,545,265
Baltimore & Ohio Chicago Terminal.....	246	954,995	164,622	1,119,617	174,340	234,749	24,487	300,921	856,628	311,061	456,378
Baltimore & Ohio Chicago Terminal.....	2,381	18,349,093	6,358,570	24,707,663	2,889,240	5,469,570	704,573	589,935	20,319,229	1,455,027	5,603,313
Baltimore & Ohio Chicago Terminal.....	1,089	4,438,654	1,065,007	5,503,661	687,405	1,301,110	94,242	177,257	4,185,730	175,661	132,867
Baltimore & Ohio Chicago Terminal.....	164	1,551,154	498,021	2,049,175	360,492	298,675	757,904	74,728	1,542,442	51,453	580,578
Baltimore & Ohio Chicago Terminal.....	881	13,754,123	2,131,906	15,886,029	2,835,086	3,610,331	241,429	567,876	11,554,945	509,119	1,187,152
Baltimore & Ohio Chicago Terminal.....	959	22,287,958	6,268,121	28,556,079	3,344,136	9,249,055	656,747	679,988	20,334,484	1,510,632	988,660
Baltimore & Ohio Chicago Terminal.....	2,569	12,289,907	3,260,598	15,550,505	1,993,700	3,099,575	342,565	496,200	11,056,031	5,543,597	4,757,442
Baltimore & Ohio Chicago Terminal.....	255	954,281	1,269,975	2,224,256	152,650	220,515	428,302	47,912	866,981	402,994	161,610
Baltimore & Ohio Chicago Terminal.....	400	515,708	235,534	751,242	100,033	142,347	19,006	24,989	591,957	221,904	59,835
Baltimore & Ohio Chicago Terminal.....	79	1,122,826	112,612	1,235,438	110,956	91,332	16,994	23,315	569,633	53,450	503,039
Baltimore & Ohio Chicago Terminal.....	191	1,203,089	468,749	1,671,838	278,396	305,815	60,939	45,022	1,211,573	30,240	197,075
Baltimore & Ohio Chicago Terminal.....	441	1,181,942	131,550	1,313,492	139,658	182,659	33,184	51,968	1,136,905	59,753	6,752
Baltimore & Ohio Chicago Terminal.....	273	2,740,487	166,981	2,907,468	3,029,245	569,510	778,493	79,007	1,999,468	1,029,777	155,662
Baltimore & Ohio Chicago Terminal.....	369	3,088,008	241,547	3,329,555	439,779	611,318	17,866	1,984,229	1,984,229	1,433,540	178,220
Baltimore & Ohio Chicago Terminal.....	628	1,317,748	658,269	1,976,017	385,429	316,086	72,940	94,339	1,771,248	40,912	143,970
Baltimore & Ohio Chicago Terminal.....	185	823,975	160,335	984,310	149,206	168,659	73,693	55,179	780,261	235,704	50,687
Baltimore & Ohio Chicago Terminal.....	1,027	4,269,056	980,892	5,250,948	722,439	802,548	168,456	210,866	3,481,068	2,200,590	1,889,289
Baltimore & Ohio Chicago Terminal.....	776	5,782,946	47	5,783,023	632,289	1,175,031	51,148	168,082	3,909,062	320,020	1,919,624
Baltimore & Ohio Chicago Terminal.....	1,938	30,064,613	6,790,513	36,855,126	4,368,670	9,762,620	846,752	915,628	31,071,507	9,622,088	1,087,750
Baltimore & Ohio Chicago Terminal.....	87	745,473	102,102	847,575	90,828	102,102	263,373	510,188	510,188	30,395	343,675
Baltimore & Ohio Chicago Terminal.....	745	1,851,526	1,505,088	3,356,614	444,607	511,373	81,539	148,791	2,811,468	1,353,729	174,959
Baltimore & Ohio Chicago Terminal.....	454	2,869,139	1,146,419	4,015,558	522,139	636,824	65,965	130,015	2,985,504	1,236,757	107,046
Baltimore & Ohio Chicago Terminal.....	1,345	5,730,385	2,277,554	8,007,939	1,180,727	1,473,500	262,735	318,766	7,077,014	1,576,870	345,372
Baltimore & Ohio Chicago Terminal.....	307	1,454,538	560,903	2,015,441	239,321	448,135	106,999	68,019	1,807,766	374,796	338,532
Baltimore & Ohio Chicago Terminal.....	395	996,191	509,852	1,506,043	230,335	333,106	94,326	93,536	1,445,092	85,746	226,678
Baltimore & Ohio Chicago Terminal.....	575	2,328,709	1,402,500	3,731,209	4,055,317	667,952	1,729,477	1,729,477	3,079,344	975,973	183,708
Baltimore & Ohio Chicago Terminal.....	347	3,660,512	1,424,278	5,084,790	821,464	1,088,051	174,927	134,875	4,638,828	313,280	763,400
Baltimore & Ohio Chicago Terminal.....	8,051	37,309,349	10,161,519	47,470,868	5,025,342	5,460,140	871,813	930,560	27,006,113	25,682,778	3,342,782
Baltimore & Ohio Chicago Terminal.....	398	915,698	230,970	1,146,668	153,257	271,541	22,112	62,344	831,514	69,490	308,236
Baltimore & Ohio Chicago Terminal.....	1,937	9,947,604	2,287,998	12,235,602	1,734,237	1,867,713	250,801	304,351	8,636,617	4,717,107	378,830
Baltimore & Ohio Chicago Terminal.....	352	3,740,985	644,687	4,385,672	548,147	907,879	84,758	131,757	3,228,744	334,950	1,143,304



## REVENUES AND EXPENSES OF RAILWAYS

NINE MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses			Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) last year.
		Freight.	Passenger.	Total, inc. misc. structures.	Way and equipment.	Maintenance of equipment.	Traffic.	Trans- portation.	Miscel- laneous.	General.	Total.
Houston, East & West Texas.....	191	\$21,057	\$231,705	\$1,011,271	\$180,454	\$158,997	\$17,091	\$420,280	\$821	\$28,667	\$806,053
Houston & Texas Central.....	860	\$647,327	\$1,136,913	\$5,140,918	\$881,842	\$719,299	\$138,454	\$2,038,861	18,478	\$159,160	\$3,952,918
Illinois Central.....	4,767	\$3,240,312	\$9,844,633	\$47,736,099	\$6,342,729	\$10,372,624	\$933,320	\$17,259,056	269,876	\$1,148,299	\$36,092,953
Indiana Harbor Belt.....	110	.....	.....	.....	2,484,198	309,771	238,981	1,098,630	.....	68,387	\$743,011
International & Great Northern.....	1,159	\$5,195,418	\$1,388,114	\$7,107,819	\$1,167,215	\$1,237,819	209,103	\$3,159,707	25,959	\$271,290	\$1,036,727
Kanawha & Michigan.....	177	\$1,864,604	\$262,082	\$2,187,534	\$302,210	\$563,287	24,331	\$659,858	31	\$59,062	\$1,608,780
Kansas City Mexico & Orient.....	827	\$5,846,686	\$1,090,409	\$7,625,730	\$1,190,969	\$874,334	256,186	\$2,599,815	.....	\$371,140	\$4,880,370
Kansas City Southern.....	900	\$3,474,806	\$759,539	\$4,270,719	\$874,499	\$733,860	123,340	\$1,735,379	.....	\$110,368	\$3,290,446
Lake Erie & Western.....	97	\$1,206,461	\$87,297	\$1,309,180	\$175,450	\$179,181	12,708	\$482,608	.....	\$37,350	\$883,973
Lehigh & Hudson River.....	294	\$1,741,725	\$1,369,008	\$3,110,733	\$244,547	\$274,569	17,273	\$511,529	.....	\$53,052	\$1,060,969
Lehigh Valley.....	1,443	\$2,627,017	\$3,069,775	\$5,696,792	\$3,355,486	\$6,206,283	695,346	\$11,534,062	106,859	\$661,434	\$22,955,955
Long Island.....	328	\$2,759,750	\$746,167	\$3,505,917	\$1,071,692	\$1,081,036	101,262	\$4,202,881	64,253	\$253,913	\$6,775,041
Louisiana & Arkansas.....	279	\$1,056,600	\$165,691	\$1,222,291	\$222,217	\$210,603	24,772	\$386,219	.....	\$37,580	\$604,949
Louisiana Ry. & Navigation Co.....	351	\$1,219,949	\$198,136	\$1,518,085	\$279,683	\$160,263	50,894	\$1,515,145	.....	\$48,173	\$1,154,158
Louisiana Western.....	208	\$1,050,945	\$107,007	\$1,157,952	\$162,318	\$162,318	37,442	\$432,766	.....	\$59,915	\$899,672
Louisville & Nashville.....	5,034	\$2,062,338	\$3,121,524	\$5,183,862	\$672,086	\$821,156	1,008,866	\$3,177,603	149,751	\$926,184	\$29,920,895
Louisville, Henderson & St. Louis.....	200	\$696,904	\$293,163	\$990,067	\$218,332	\$144,762	48,035	\$361,835	.....	\$244,363	\$617,054
Maine Central.....	1,219	\$5,392,204	\$2,581,818	\$7,974,022	\$1,214,321	\$1,314,091	361,088	\$2,625,887	49,378	\$244,363	\$6,170,543
Michigan Central.....	1,800	\$15,395,840	\$6,673,688	\$24,069,528	\$2,853,894	\$4,061,419	\$564,697	\$10,352,379	443,310	\$11,929	\$18,767,627
Midland Valley.....	380	\$704,982	\$314,499	\$1,019,481	\$210,762	\$188,195	18,756	\$361,604	.....	\$9,521	\$256,843
Minneapolis & St. Louis.....	1,646	\$5,918,013	\$1,479,061	\$7,397,074	\$877,439	\$1,114,677	161,839	\$3,036,723	128,669	\$186,444	\$5,377,592
Minn., St. Paul & Sault Ste. Marie.....	4,104	\$15,519,462	\$4,513,998	\$20,033,460	\$2,347,114	\$3,116,007	443,247	\$13,462,559	8,180,835	\$443,247	\$24,825,559
Missouri & North Arkansas.....	365	\$78,846	\$272,019	\$350,865	\$264,631	\$200,520	29,982	\$464,832	.....	\$1,576	\$1,011,532
Missouri, Kansas & Texas System.....	3,865	\$17,565,465	\$6,274,382	\$23,839,847	\$3,378,964	\$3,378,964	498,762	\$9,301,545	775,067	\$103,287	\$17,456,385
Missouri, Oklahoma & Gulf.....	334	\$222,133	\$170,560	\$392,693	\$206,263	\$162,318	37,442	\$432,766	967	\$59,915	\$899,672
Missouri, Oklahoma & Gulf Ry. of Texas.....	19	\$96,604	\$101,488	\$198,092	\$41,127	\$41,127	1,964	\$82,646	.....	\$4,364	\$86,970
Missouri Pacific.....	3,920	\$16,273,965	\$3,571,982	\$19,845,947	\$2,750,835	\$4,129,592	529,356	\$8,506,646	67,749	\$28,658	\$16,512,836
Mobile & Ohio.....	1,122	\$6,786,979	\$951,966	\$7,738,945	\$823,725	\$1,420,307	361,088	\$2,625,887	23,616	\$258,446	\$6,050,526
Monongahela.....	75	\$765,035	\$18,447	\$783,482	\$145,148	\$145,148	66,690	\$207,292	.....	\$18,442	\$443,102
Morgan's La. & Tex. R. & S. Co.....	405	\$2,642,140	\$96,749	\$2,738,889	\$1,131,870	\$1,607,109	408,285	\$1,346,742	22,305	\$106,510	\$2,604,971
Nashville, Chattanooga & St. Louis.....	1,231	\$5,422,140	\$1,929,294	\$7,351,434	\$824,656	\$1,131,797	610,921	\$3,607,083	83,057	\$268,001	\$6,930,191
Nevada Northern.....	165	\$686,571	\$68,533	\$755,104	\$143,041	\$118,153	4,546	\$198,875	549	\$34,833	\$499,598
New Orleans & North Eastern.....	204	\$1,973,921	\$406,793	\$2,380,714	\$274,951	\$552,009	82,467	\$943,688	52,176	\$105,253	\$2,015,324
New Orleans Great Northern.....	283	\$655,749	\$213,940	\$869,689	\$188,948	\$188,948	23,595	\$374,821	1,635	\$57,323	\$788,335
New Orleans, Mobile & Chicago.....	403	\$1,056,345	\$220,228	\$1,276,573	\$260,700	\$182,245	34,271	\$474,239	.....	\$61,668	\$1,013,174
New Orleans, Texas & Mexico.....	286	\$921,796	\$177,688	\$1,100,484	\$238,953	\$148,576	35,554	\$469,490	.....	\$84,959	\$977,068
New York Central & Hudson River.....	5,982	\$23,836,615	\$9,633,550	\$33,470,165	\$4,055,330	\$8,761,737	719,019	\$14,597,431	613,519	\$1,047,623	\$29,794,426
New York, Chicago & St. Louis.....	568	\$7,113,762	\$998,855	\$8,112,617	\$841,602	\$999,537	379,072	\$3,981,248	44,791	\$180,847	\$6,760,280
New York, New Haven & Hartford.....	2,003	\$22,410,331	\$20,079,481	\$42,489,812	\$5,647,248	\$7,227,859	1,319,220	\$18,310,267	437,214	\$1,195,875	\$33,122,658
New York, Ontario & Western.....	568	\$4,564,996	\$1,226,012	\$5,791,008	\$843,711	\$1,249,313	74,735	\$2,677,907	.....	\$140,392	\$4,986,058
New York, Philadelphia & Norfolk.....	112	\$2,143,365	\$368,756	\$2,512,121	\$263,088	\$558,362	39,329	\$1,216,617	41,429	\$90,239	\$2,211,044
New York, Susquehanna & Norfolk.....	140	\$1,663,958	\$390,558	\$2,054,516	\$227,046	\$266,056	21,850	\$1,040,739	.....	\$48,475	\$1,603,062
Norfolk & Western.....	2,044	\$6,067,564	\$3,511,770	\$9,579,334	\$4,062,507	\$6,128,902	525,097	\$9,346,286	83,317	\$618,422	\$20,389,730
Norfolk Southern.....	900	\$1,909,776	\$783,627	\$2,693,403	\$397,196	\$460,068	65,381	\$1,107,204	774	\$177,987	\$2,208,608
Northern Pacific.....	6,497	\$33,896,504	\$10,311,666	\$44,208,170	\$5,983,809	\$6,122,386	839,861	\$14,674,305	711,933	\$825,408	\$28,270,364
Northern Pacific.....	401	\$1,037,695	\$1,319,250	\$2,356,945	\$475,568	\$666,776	43,465	\$1,044,142	.....	\$73,609	\$1,969,525
Oahu Railway & Land Co.....	109	\$684,231	\$194,907	\$879,138	\$91,896	\$79,275	5,973	\$94,524	.....	\$38,523	\$410,191
Oregon Short Line.....	2,162	\$10,766,013	\$3,307,268	\$14,073,281	\$2,063,306	\$2,149,091	277,853	\$3,846,011	233,878	\$490,863	\$8,990,859
Oregon-Washington R. R. & Nav. Co.....	1,995	\$7,524,743	\$3,248,991	\$10,773,734	\$1,316,212	\$1,444,923	348,014	\$3,938,993	109,432	\$511,905	\$7,605,404
Panhandle & Santa Fe.....	669	\$2,335,878	\$507,420	\$2,843,298	\$550,479	\$799,308	35,049	\$942,490	.....	\$77,381	\$2,184,707
Pennsylvania Company.....	1,757	\$28,068,507	\$7,284,476	\$35,352,983	\$5,719,252	\$7,521,077	685,832	\$14,874,431	319,106	\$1,006,176	\$30,125,873
Pennsylvania Railroad.....	4,312	\$9,293,242	\$2,674,725	\$11,967,967	\$1,834,421	\$2,723,030	1,861,074	\$5,190,185	2,028,616	\$3,688,782	\$105,886,046
Pere Marquette.....	2,317	\$9,590,925	\$3,048,213	\$12,639,138	\$1,200,694	\$2,054,355	288,704	\$5,370,120	41,530	\$383,983	\$9,936,432
Philadelphia & Reading.....	1,119	\$7,872,854	\$4,882,553	\$12,755,407	\$3,105,073	\$3,662,601	417,917	\$12,480,846	146,234	\$633,589	\$23,189,171
Philadelphia, Baltimore & Washington.....	717	\$2,617,730	\$1,495,329	\$4,113,059	\$2,296,493	\$2,880,268	247,445	\$6,480,437	156	\$411,326	\$12,316,125
Pittsburgh & Lake Erie.....	225	\$8,661,706	\$1,217,000	\$9,878,706	\$1,353,774	\$2,383,466	127,674	\$2,940,602	29,911	\$259,366	\$7,085,880
Pittsburgh, Cincinnati, Chic. & St. Louis.....	1,479	\$19,443,085	\$6,009,924	\$25,453,009	\$3,649,549	\$5,693,575	589,990	\$10,886,711	218,311	\$712,960	\$21,751,096
Pittsburgh, Shawmut & Northern.....	294	\$1,298,359	\$94,550	\$1,392,909	\$249,270	\$382,431	14,832	\$470,121	.....	\$36,781	\$1,534,148
Port Reading.....	21	\$444,954	\$99,634	\$544,588	\$99,634	\$99,634	348	\$301,679	.....	\$1,162	\$567,474
Richmond, Fredericksburg & Potomac.....	88	\$1,048,456	\$733,714	\$1,782,170	\$205,366	\$273,228	30,883	\$778,952	40,306	\$64,602	\$1,376,160
Rutland.....	468	\$1,411,344	\$564,061	\$1,975,405	\$314,899	\$445,445	74,727	\$1,028,533	10,483	\$2,318	\$1,926,604
St. Joseph & Grand Island.....	258	\$842,204	\$225,131	\$1,067,335	\$193,254	\$177,516	42,665	\$1,031,168	.....	\$47,000	\$891,504
St. Louis & San Francisco.....	4,749	\$21,381,017	\$7,705,889	\$29,086,906	\$4,154,845	\$4,999,653	592,073	\$10,469,998	.....	\$819,250	\$20,915,859
St. Louis, Brownsville & Mexico.....	548	\$1,001,606	\$546,592	\$1,548,198	\$308,875	\$308,875	48,482	\$633,241	.....	\$97,116	\$2,167,544
St. Louis, Iron Mountain & Southern.....	3,364	\$17,269,933	\$3,984,484	\$21,254,417	\$4,152,611	\$5,314,671	531,467	\$7,304,993	73,721	\$572,771	\$15,918,436
St. Louis Merchants' Bridge Terminal.....	9	.....	.....	.....	\$1,604	\$1,604	6,986	\$7,007,274	.....	\$57,849	\$1,012,933
St. Louis, San Francisco & Texas.....	235	\$1,617,316	\$231,837	\$1,849,153	\$218,231	\$156,621	20,542	\$429,140	29,241	\$40,900	\$865,434
St. Louis, Southwestern.....	943	\$4,144,850	\$900,450	\$5,045,300	\$730,712	\$929,583	231,560	\$1,529,458	.....	\$237,875	\$3,596,948
St. Louis Southwestern of Texas.....	811	\$1,975,237	\$703,309	\$2,678,546	\$687,042	\$719,501	108,961	\$1,396,267	7,120	\$160,921	\$3,021,762
San Antonio & Aransas Pass.....	724	\$1,995,299	\$802,712	\$2,798,011	\$615,639	\$562,012	59,200	\$1,431,485	.....	\$105,267	\$2,773,303

†Road reorganized July 8, 1914. No cumulative figures shown.

‡Road reorganized January 1, 1915. Figures shown here are for three months ending March 31, 1915.

## REVENUES AND EXPENSES OF RAILWAYS

NINE MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues				Operating expenses				Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.
		Freight.	Passenger.	Total.	Maintenance of way and structures.	Equipment.	Traffic.	Transportation.	Miscellaneous.				
San Pedro, Los Angeles & Salt Lake.....	1,132	\$4,392,678	\$1,829,937	\$6,222,615	\$679,758	\$1,063,654	\$293,614	\$2,278,663	\$132,083	\$4,610,805	\$164,032	\$4,774,837	\$1,866,613
Seaboard.....	3,101	10,693,227	3,472,663	14,165,890	1,860,241	2,399,754	578,127	5,889,773	87,694	11,309,811	4,608,407	6,701,404	3,796,976
Southern.....	7,035	30,626,658	12,536,612	43,163,270	6,550,820	8,487,207	1,625,524	17,439,710	298,979	35,751,114	11,575,120	24,175,994	9,622,941
Southern in Mississippi.....	281	475,691	235,775	711,466	200,650	79,932	22,256	361,546	33,370	697,753	92,902	604,851	376,929
Southern Pacific.....	6,517	44,042,367	20,613,982	64,656,349	7,207,206	10,477,873	1,458,877	23,180,988	1,215,898	45,387,748	3,598,849	41,788,899	13,997,168
Spokane International.....	163	423,469	135,494	558,963	98,020	42,602	20,233	191,723	33	32,002	384,613	32,386	153,880
Spokane, Portland & Seattle.....	556	2,032,596	1,078,364	3,110,960	475,534	319,975	68,482	796,008	30,335	3,086,962	480,600	2,606,362	1,002,263
Tennessee Central.....	294	751,901	288,870	1,040,771	265,847	150,031	49,272	445,051	.....	1,095,822	40,272	1,055,550	189,056
Terminal R. R. Ass'n of St. Louis.....	35	.....	1,650	1,650	1,650	1,650	.....	.....	.....	.....	257,836	738,192	234,971
Texas & New Orleans.....	469	1,867,150	794,365	2,661,515	166,410	114,531	71,685	1,222,602	80,544	2,681,553	143,129	2,538,424	81,034
Texas & Pacific.....	1,887	9,704,523	3,179,408	12,883,931	1,422,290	2,149,449	330,701	5,220,202	128,583	13,883,783	627,436	13,256,347	3,061,914
Toledo & Ohio Central.....	446	3,160,517	1,500,543	4,661,060	777,897	753,897	71,851	1,476,455	15,756	4,837,915	200,355	4,637,560	7,964
Toledo, Peoria & Western.....	248	524,736	358,663	883,399	144,607	244,104	22,066	401,427	.....	884,743	54,900	829,843	25,239
Toledo, St. Louis & Western.....	451	2,991,687	247,498	3,239,185	412,201	524,104	149,238	1,365,058	.....	2,889,927	208,980	2,680,947	745,437
Trinity & Brazos Valley.....	332	620,627	148,321	768,948	183,071	98,436	27,325	395,209	.....	728,859	39,305	689,554	12,062
Union Pacific.....	129	370,242	259,751	630,000	118,372	153,785	13,139	363,121	536	681,506	29,700	651,806	47,217
Union Pacific.....	3,616	27,901,027	7,415,340	35,316,367	4,488,505	5,619,092	862,184	10,080,031	631,702	45,896,461	1,778,831	44,117,630	15,008,295
Union R. R. of Baltimore.....	9	1,005,883	190,490	1,196,373	121,713	.....	41,538	.....	.....	1,237,911	51,648	1,186,263	37,576
Union R. R. of Pennsylvania.....	31	.....	2,461,079	2,461,079	364,114	846,159	1,013	1,128,213	.....	3,595,292	30,073	3,565,219	5,610
Vandalia.....	910	5,671,785	1,794,803	7,466,588	1,088,992	1,680,454	212,533	3,310,272	86,052	8,776,840	291,729	8,485,111	232,112
Vicksburg, Shreveport & Pacific.....	171	580,020	339,634	919,654	189,036	245,020	32,012	410,425	20,458	1,399,080	64,307	1,334,773	242,083
Virginia & Southwestern.....	240	1,224,288	122,010	1,346,298	338,197	326,442	21,493	408,251	.....	1,754,549	59,566	1,694,983	80,470
Virginian.....	503	3,757,658	283,242	4,040,900	549,814	767,080	48,295	1,006,032	88,737	5,046,932	1,786,166	3,260,766	1,593,425
Wabash.....	2,518	15,388,579	4,686,518	20,075,097	2,970,948	4,037,959	773,220	9,115,220	127,935	20,890,243	729,118	20,161,125	398,763
Washington Southern.....	36	309,200	359,631	668,831	110,834	135,269	17,421	374,459	17,221	1,043,310	234,722	808,588	192,892
West Jersey & Seashore.....	356	1,380,130	3,092,838	4,472,968	824,711	770,791	115,884	2,142,365	24,460	6,615,333	29,462	6,585,871	205,099
Western Maryland.....	661	5,185,136	726,832	5,911,968	888,725	1,038,135	197,838	2,294,174	19,306	8,206,142	225,500	7,980,642	1,034,168
Western Pacific.....	943	3,034,201	865,767	3,899,968	867,673	1,419,904	219,934	1,401,314	97,178	5,171,749	258,664	4,913,085	1,054,168
Western R. of Alabama.....	133	528,535	327,408	855,943	172,119	225,795	52,562	290,297	13,906	1,181,747	152,545	1,029,202	29,766
Wheeling & Lake Erie.....	459	3,134,334	427,298	3,561,632	427,379	771,234	83,400	1,559,576	13,441	5,144,851	282,407	4,862,444	160,728
Yazoo & Mississippi Valley.....	1,382	6,811,216	1,723,017	8,534,233	1,335,114	1,260,081	153,410	3,363,004	15,673	11,897,237	456,000	11,441,237	1,041,728
													-660,374

## Traffic News

The House public utility committee of the Illinois legislature has recommended for passage a bill permitting newspapers to exchange advertising for railroad transportation. The bill has already been passed by the senate.

The Boston & Maine announces a new local passenger tariff, between stations in Massachusetts, to go into effect June 1. The changes made include both increases and decreases. The increases are between points where the traffic is heavy and the decreases in thinly settled territory.

It is announced that the steamer James S. Whitney, of the Eastern Steamship Corporation, will this week make a trip through the Cape Cod Canal, with a view to "demonstrating" that by this route it is possible to shorten the journey between New York and Boston about four hours, as compared with sailing around the Cape.

## A Suggestion to the Interstate Commerce Commission

W. H. Forsyth, second vice-president of the Curtin Supply Company, Chicago, has written a letter to Commissioner W. M. Daniels, of the Interstate Commerce Commission, who presided over the hearings in the western freight rate advance case in Chicago, suggesting that the commission "broadly authorize a universal increase in railroad rates of this country on existing tariffs, with a distinct proviso that the money derived by the railroads from this increase should be promptly and only expended for necessary renewals, replacements and improvements." Mr. Forsyth says that generally speaking the public wants service, and no one who has the welfare of the country at heart can find serious objection to a reasonable increase in rates provided such increase is spent for the upbuilding of railroad property, and that no industry could legitimately complain, providing the same proportional increase is made on the products of all its competitors. During the continuance of this increased rate, he says, "no additional rate of dividends should be paid from any moneys derived under this authority, but all should go to the actual benefit of the property," although "certain railroads whose working capital might be depleted, could perhaps be permitted to retain a reasonable amount for this purpose."

## Educating the Public to Buy Tickets

T. J. Foley, general manager of the Illinois Central, has issued a pamphlet addressed to the people of Mississippi for the purpose of explaining the aims and desires of the management of the road in the matter of educating the traveling public to purchase tickets instead of paying cash fares on trains, and presenting arguments in favor of the plan of imposing a small penalty upon those who carelessly or negligently fail to buy tickets. It is stated that on the Yazoo & Mississippi Valley, particularly where stations are close together, it is often necessary to check the speed of a train and disarrange the schedule in order that the conductor may be enabled to collect the cash fares from passengers between stations.

"Please let it be thoroughly understood," Mr. Foley says, "that we do not want the extra ten cents and should be greatly pleased if it never became necessary to collect it, that is, if passengers in every instance would purchase tickets and thus relieve the company of the unpleasant duty of reminding them of their failure to do so." The practice of imposing a penalty, he says, has been fully justified and approved by the courts as well as by the Interstate Commerce Commission. In spite of this fact, the Railroad Commission of Mississippi on March 2, 1915, fined the Illinois Central \$500 on the theory that it had violated an order of the commission limiting the charge for carrying passengers to three cents a mile. It is pointed out that in other states in which the company's lines are located the rule for collecting a 10-cent penalty is in full effect and working without any friction whatever. In conclusion Mr. Foley says, "We submit our case to you confident that we shall feel the force and effect of your decision, whatever it may be."



## Commission and Court News

### INTERSTATE COMMERCE COMMISSION

The commission has suspended until September 12 tariffs of the Erie and other roads, containing proposed advances in rates on sugar beets from points between Buffalo and Chicago to Decatur, Ind.

#### Rates on Scrap Iron from Gulf Ports

*Opinion by Commissioner Clark:*

The commission finds that the carriers have justified proposed increased rates and minimum carload weights on scrap steel and iron, from a broad territory east of the Mississippi and south of the Ohio rivers, which may be described generally as the Mississippi valley, and from certain gulf ports, including Mobile, Ala., and New Orleans, La., to St. Louis, Mo., Ohio river crossings, and points beyond. (33 I. C. C., 668.)

#### Ore Rates in Northern Michigan

*Newport Mining Company v. Chicago & North Western. Opinion by Commissioner McChord:*

Prior to January, 1913, the carriers serving mines in the northern peninsula of Michigan maintained a rate on iron ore of 40 cents per gross ton from all mines in the peninsula to the hold of vessel at nearest port, either Ashland or Escanaba except that from the mines between Ishpeming and Marquette the rate was 25 cents, and west thereof the rate was 30 cents to Marquette. In January, 1913, they filed tariffs continuing the former rate, but limited the service to originating the ore and hauling it to the dockyard only. For the dock service formerly included in the rate they made an additional charge of 5 cents a ton.

The commission finds that the effect of this charge is to increase the rate and that the carriers must justify the increased total charges.

After due consideration of the comparative ton-mile earnings and a study of the figures submitted by the carriers as to the costs of the dock, assembling and line-haul services it finds that the increased rates are justified. The rate is a blanket rate applicable via the lines of carriers of different financial condition. While the position of the North Western appears to be favorable, and while it appears from the record that its revenues meet all its operating needs and more, yet the situation with respect to the St. Paul, the Soo and the South Shore, is far less satisfactory. The reasonableness of a rate in a locality served by several carriers will not be determined alone by consideration of that line most favorably situated with respect to operations, traffic, and earnings, and conversely this is equally true, namely, that consideration of the line of poorest traffic, earnings, etc., will not control. (33 I. C. C., 645.)

#### Rates to Intermountain Territory

The commission has disapproved plans submitted by the trans-continental railroads for constructing rates to points east of Pacific coast terminals and in the inter-mountain country—the so-called back-haul rates.

The commission, however, has authorized the railroads to construct rates to the back-haul points by adding to the terminal rates not more than 75 per cent of the local rates from the nearest terminal to destination, or by adding arbitraries to the terminal rates, varying with the distance from the ports. The arbitraries are to be not more than 75 per cent of the local rates.

The carriers have also been authorized to extend terminal rates to these Pacific coast points: San Diego, San Pedro, East San Pedro, Wilmington, East Wilmington, San Francisco and Oakland, Cal.; Astoria and Portland, Ore.; Vancouver, Bellingham, South Bellingham, Everett, Tacoma, Seattle, Aberdeen, Hoquiam and Cosmopolis, Wash.

The commission has modified existing orders so as to permit maximum less than carload rates from the Missouri river to intermediate points on first and second-class of \$1.72 per 100 lb., when lower rates are applicable to coast terminals.

Announcing that it has considered the influence of the Panama canal, the commission says: "We should authorize a certain degree of relief from the requirements of the long and short haul clause on this traffic to enable these carriers to more effectively compete with the water lines, but the rail carriers cannot expect, and the commission should not authorize, such a degree of relief as will secure to the rail lines the same percentage of the traffic to the terminals as they enjoyed prior to the opening of the canal. They can secure a portion of the traffic to the terminals on the commodities by the establishment of the rates proposed, and such rates will afford some revenue in excess of the out-of-pocket cost involved.

"The carriers should, within reasonable limits, be authorized to make such rates to intermediate points in the so-called back-haul territory as will induce the direct movement of freight to such points from the territories served by these lines. The proportion of the freight hauled directly by the rail lines to the various destinations in the back-haul territory should be greater than the proportion hauled to the terminals and should increase as distance from the coast of terminals increases. The rates to all coast terminal points being practically the same, and the situations at intermediate points being substantially similar via all lines, the same method of constructing rates to intermediate points should be followed by all lines."

### STATE COMMISSIONS

The New York State Public Service Commission, Second district, announces that it has awarded reparation in the case of A. R. Piper vs. New York Central on a shipment from Katonah consigned to Brooklyn, Bush docks. It was misrouted to Wallabout basin, involving extra cartage expense, admitted by the carrier. Amount of reparation 50 cents.

W. M. Busby, general counsel for the Public Service Commission of Missouri, has filed a brief with the state supreme court in which he takes the ground that the commission has no authority to increase maximum railroad rates fixed by statute. The brief was filed in a case in which the Kansas City Southern appealed from a decision of the commission denying authority to increase demurrage rates. The application of the road for authority to increase the rates fixed by statute was based on a decision rendered last year by the court in the case of the Missouri Southern, that the act creating the new public service commission gave the commission authority to fix rates independent of the statutory rates.

### PERSONNEL OF COMMISSIONS

Daniel S. Hooker, formerly locating and construction engineer for the Colorado & Southern, has been appointed civil engineer of the Public Utilities Commission of Colorado.

H. H. Sanborn and A. B. Roehl have resigned as rate expert and assistant rate expert, respectively, of the Railroad Commission of California to engage in the practice of law.

A. L. Moler has been appointed senior inspector of motive power for the eastern district, in the division of valuation, Interstate Commerce Commission, with headquarters at Washington, D. C.

The governor of Pennsylvania has nominated for membership on the Public Service Commission the following: Samuel W. Pennypacker, chairman, and Milton J. Brecht, to succeed themselves; W. A. Magee of Pittsburgh; Congressman E. R. Kiess of Hughesville; W. D. B. Ainey of Montrose; John Monaghan of Philadelphia; John S. Rilling of Erie.

### COURT NEWS

Bondholders of the Pere Marquette filed suit in the United States district court at Detroit, Mich., last week to have the Michigan two-cents-a-mile passenger fare law declared unconstitutional, on the ground that it is confiscatory of the railroad property.

Thirty Texas roads have filed suit in the district court at Austin, Tex., to set aside an order of the Texas Railroad Commission made on February 13, prohibiting the railroads from inserting in their bills of lading stipulations requiring notice of claims for damages or loss of freight to be filed within six

months. The petition says in part: "Correct business principles require a prompt presentation of freight claims. Under the application of such principles as generally observed in practice by the business world in this state, legitimate claims of all kinds are presented without unreasonable delay. A delay in the presentation of claims works to the advantage of dishonest claimants, facilitates the collection of fraudulent claims, and mulcts the railroads in damages for which they are not legally liable and which in reason they ought not to have to pay."

#### Liability for Servants' Acts

A passenger who had been ejected from a train by two special policemen employed by the railroad, brought an action against the company and the two policemen. The jury returned a verdict in favor of the policemen and against the company. It was held by the Iowa Supreme Court error to enter a judgment against the company, since it was liable only under the rule of *respondet superior* for the wrongful acts of its servants, and, if they were not guilty of wrong, the company could not be.—*Hobbs v. Illinois Central (Iowa)* 152 N. W., 40.

#### Train Dispatchers Working Twelve Hours a Day

A railroad company is held not to be relieved from liability for violation of section 2 of the hours of service act by requiring a train dispatcher in a night and day office to remain on duty for more than 9 hours in each 24-hour period, by the fact that during a part of such time he is employed otherwise than as train dispatcher.—*Delano v. United States, C. C. A., 220 Fed., 635*. A railroad company had on duty at a day and night office three operators, each of whom worked 8 hours a day. One was suddenly taken ill, and no other operator could be obtained. As soon as possible, which was next day, the chief dispatcher sent a relief man, but the train on which he was traveling was wrecked, and he was ordered to establish an office at the wreck. This caused further delay, in consequence of which the two remaining operators each worked 12 hours a day for 4 or 5 consecutive days. It is held that the extended time during the first three days was permissible under section 2, and the further delay was due to a casualty which, under section 3, rendered the act inapplicable, and the company was not chargeable with its violation.—*San Pedro, L. A. & S. L. v. United States, C. C. A., 220 Fed., 737*.

#### Empty Car, Standing, is An Instrument of Interstate Commerce

The Pennsylvania Supreme Court holds that where a freight car consigned with merchandise from a point without the state to a destination within the state, after being unloaded at a freight yard is shifted to another yard to await reloading, and is stored there for a few days, and then loaded and shipped to another point without the state, it does not cease to be used in interstate traffic during the brief period of its unemployment; and the railroad company is liable for injuries to an employee in the shifting of the car from yard to yard, due to the company's failure to equip the car with an automatic coupler as required by law. *Moyer v. Pennsylvania (Pa.)* 93 Atl. 574. In an action for injuries to a brakeman the Indiana Supreme Court holds that a railroad laborer, working on a track which was to be used for both interstate and intrastate traffic, but over which interstate trains had never been run, is not engaged in interstate commerce within the federal employers' liability act.—*Chicago & E. v. Steele (Ind.)* 108 N. E. 4. In an action under the federal employers' liability act for the death of an engineman by falling into a roundhouse pit, it was held by the South Carolina Supreme Court that the plaintiff could not recover if the engineer went into the roundhouse for purposes of his own, or if there was a failure of evidence from which it could be inferred that he went there for the purposes of his employment; since the plaintiff must show that the deceased was engaged in interstate commerce at the time of his death. The court held that the jury was warranted in finding that the deceased went into the roundhouse to inspect his engine some time before taking it out on his run (although there was no rule of the company requiring him to do so), and that he was engaged in interstate commerce. Justices Hydrick and Gage dissented, being of opinion that the engineer went into the roundhouse on his own business, out of the hours, against the rules and practice of the railroad, and to unwarrantably sleep in his engine.—*Padgett v. Seaboard Air Line (S. Car.)* 83 S. E. 633.

## Railway Officers

#### Executive, Financial, Legal and Accounting

D. F. Mustard, cashier of the Central Indiana, has been elected treasurer, with office at Anderson, Ind., and the office of cashier is abolished.

S. S. Russell, superintendent of the Central Vermont, at St. Albans, Vt., has been appointed special agent of the auditing department, with office at St. Albans.

E. M. Devereux, assistant treasurer of the Baltimore & Ohio at New York, has been appointed senior assistant treasurer, with headquarters at New York, succeeding Charles W. Rhodes, deceased, and T. H. Schultz, cashier in the general offices at Baltimore, Md., has been promoted to junior assistant treasurer, with office at Baltimore.

F. P. Gutelius, general manager of the Canadian government railways, announces that the jurisdiction of the heads of departments has been extended over the National Transcontinental from Moncton, N. B., to Winnipeg, Man., and the Lake Superior branch of the Grand Trunk Pacific from Fort William, Ont., to Superior Junction, Ont. The operation of these lines was taken over by the government May 1.

#### Operating

W. S. Hanley, chief engineer of the New Orleans Great Northern, has been appointed superintendent, with headquarters at Bogalusa, La.

C. M. Staples has been appointed assistant superintendent of the Houston & Texas Central, at Ennis, Tex., succeeding C. M. Moursund, resigned.

J. D. Booth has been appointed acting superintendent of the Missouri, Oklahoma & Gulf, with headquarters at Muskogee, Okla., succeeding E. B. Fisher, resigned.

A. C. Showalter has been appointed assistant superintendent of the Buffalo division of the New York, Chicago & St. Louis, with headquarters at Conneaut, Ohio, succeeding C. L. Titus, resigned.

E. A. Dewey has been appointed trainmaster of the Missouri, Oklahoma & Gulf, with office at Muskogee, Okla., succeeding Harry Coughlin, resigned. Mr. Dewey was formerly with the Texas & Pacific.

J. E. Spaulding, trainmaster of the Central Indiana at Anderson, Ind., has been appointed superintendent. The office of trainmaster is discontinued and the superintendent will assume the duties of that office.

J. A. Blair has been appointed superintendent of dining cars of the Spokane, Portland & Seattle, the Oregon Trunk, the Oregon Electric, the United Railways and the Spokane & Inland Empire, with headquarters at Portland, Ore.

The jurisdiction of W. C. C. Mehan, general superintendent of the Grand Trunk Pacific lines west of Prince George, with headquarters at Prince Rupert, B. C., has been extended to include the territory between Prince George and Edmonton, Alta.

A. B. White, assistant superintendent of the Buffalo, Rochester & Pittsburgh at Punxsutawney, Pa., has been promoted to superintendent of the Middle and Pittsburgh divisions, with headquarters at Du Bois, vice P. Fraser, deceased, and R. L. Moore succeeds Mr. White.

J. E. Maun, acting assistant superintendent of the Central Vermont at Montpelier, Vt., has been appointed superintendent of the northern division, with office at St. Albans, Vt., vice S. S. Russell, assigned to other duties, and G. W. Groom, chief dispatcher, at St. Albans, has been appointed assistant to superintendent and chief dispatcher, with office at St. Albans.

J. Flynn, assistant superintendent of the Third division of the Denver & Rio Grande, has been appointed assistant superintendent of the Second division, with headquarters at Salida, Colo., vice D. E. Wilcox, transferred, and the office of assistant superintendent



ent of the Third division has been abolished. E. E. Eichar has been appointed trainmaster of the Third division, with headquarters at Gunnison, Colo.

A. Kilpatrick, superintendent of the Grand Trunk Pacific at Edson, Alta., has been transferred to the Lake Superior division, with headquarters at Fort William, Ont., succeeding A. A. Tisdale, who has been granted a temporary leave of absence. J. P. Kirkpatrick has been appointed acting superintendent, with jurisdiction between Edmonton and Prince George and all intersecting branch lines, with office at Edson, Alta. The jurisdiction of H. McCall, superintendent at Melville, Sask., has been extended to include the Regina division, on account of Mr. Kirkpatrick's transfer to Edson.

F. P. Brady, general superintendent of the Intercolonial Railway and the Prince Edward Island Railway, at Moncton, N. B., has been appointed general superintendent of the National Transcontinental between Quebec and Winnipeg, and the Lake Superior branch of the Grand Trunk Pacific between Fort William and Superior Junction, with headquarters at Cochrane, Ont. J. K. McNeillie, superintendent of the Canadian Pacific at Montreal, Que., has been appointed general superintendent of the Intercolonial, the Prince Edward Island and the National Transcontinental east of Quebec, with headquarters at Moncton, N. B. A. J. Gorrie has been appointed superintendent, and J. J. McManus has been appointed assistant superintendent of the National Transcontinental, district No. 1, Quebec to O'Brien, with headquarters at Quebec. W. B. Way has been appointed superintendent, and H. A. Ryan has been appointed assistant superintendent of district No. 2, O'Brien to Armstrong, excluding O'Brien, with headquarters at Cochrane, Ont., and R. S. Richardson, assistant superintendent at Moncton, N. B., has been appointed superintendent of district No. 3, Armstrong to Winnipeg, excluding Armstrong, and Superior Junction to Fort William, with headquarters at Winnipeg, Man.

#### Traffic

George F. DeMurray has been appointed general agent of the Chicago, Burlington & Quincy, with office at Sterling, Ill., succeeding L. C. Thorne, resigned.

#### Engineering and Rolling Stock

The jurisdiction of S. J. Hungerford, superintendent of rolling stock, western lines of the Canadian Northern, at Winnipeg, Man., has been extended over the eastern lines.

John J. Desmond has been appointed roadmaster of the Mississippi division of the Illinois Central, with headquarters at Water Valley, Miss., succeeding R. L. Hazlegrove, transferred.

C. E. Brooks, general foreman at the Transcona, Man., shops of the Grand Trunk Pacific, has been appointed acting superintendent of motive power, with headquarters at Transcona, succeeding Joseph Billingham, resigned.

#### Purchasing

Walter R. Owen, assistant purchasing agent of the Chicago, Rock Island & Pacific at Chicago, has been appointed assistant general purchasing agent, with headquarters at Chicago.

### OBITUARY

Edward Harding Barnes, chief engineer of the Grand Rapids & Indiana, at Grand Rapids, Mich., died on May 15, at his home in that city.

General Thomas H. Hubbard, chairman of the executive committee of the Toledo, St. Louis & Western and a director of the Wabash, the Western Union Telegraph Company and the Southern Pacific, died at his home in New York on Wednesday, May 19. Thomas Hamlin Hubbard was born at Hallowell, Me., on December 20, 1838. He graduated from Bowdoin College and served with distinction in the civil war. He was a vice-president and director of the Southern Pacific from 1896 to 1900.

**RAILWAY BRIDGE DESTROYED BY CRUISER.**—The French Ministry of Marine has reported that on April 15 a French cruiser destroyed a railway bridge connecting the town of Acre with the interior railway system of Syria.

## Equipment and Supplies

### LOCOMOTIVE BUILDING

THE CHICAGO GREAT WESTERN is asking bids on 5 Mikado type locomotives, in addition to the 5 switching engines reported in the *Railway Age Gazette* of May 7.

THE PENNSYLVANIA LINES WEST have ordered 25 Consolidation type locomotives from the Lima Locomotive Corporation, and 25 Mikado type locomotives from the Baldwin Locomotive Works.

THE GLEN ROSE & WALNUT SPRINGS, Walnut Springs, Tex., is inquiring through the Railroad Construction Company, 80 Fifth avenue, New York, for prices on 4 65-ton Mogul type locomotives.

### CAR BUILDING

THE COAL & COKE is building 100 coal cars in its shops at Gassaway, W. Va.

THE NEVADA NORTHERN is reported to be in the market for 100 dump cars. This item has not been confirmed.

THE GLEN ROSE & WALNUT SPRINGS is inquiring for prices on 10 passenger and 100 freight cars. See also item under Locomotive Building.

THE LEHIGH VALLEY has ordered 1,000 center constructions from the Standard Steel Car Company, and is said to have an option on another 1,000.

THE CHICAGO, ROCK ISLAND & PACIFIC, reported in the *Railway Age Gazette* of last week as inquiring for 5,000 40-ton all-steel box cars, is not inquiring for all-steel box cars, but rather for box cars with steel frames and single wooden sheathing.

THE PENNSYLVANIA LINES have placed orders for 16,145 freight cars as follows: American Car & Foundry Co., 3,443, including 100 refrigerator cars for the Lines West and 224 refrigerator, 1,719 hopper, 1,000 gondola and 400 box cars for the Lines East; Pressed Steel Car Company, 2,800, including 1,500 gondola and 500 hopper cars for Lines West and 500 gondola and 300 box cars for the Lines East; Standard Steel Car Company, 1,000 hopper cars, including 800 for the Lines West and 200 for the Lines East; Ralston Steel Car Company, 1,000 hopper cars for the Lines West; Cambria Steel Company, 3,300, including 3,000 hopper cars and 300 box cars for the Lines East; Haskell & Barker Car Company, 2,500 box cars for the Lines West, and the Altoona shops, 1,000 box, 1,000 gondola and 102 flat cars for the Lines East. The order is thus divided, 6,400 for the Lines West and 9,745 for the Lines East.

THE RUSSIAN GOVERNMENT, reported in the *Railway Age Gazette* of last week as having ordered 2,000 steel underframe box cars from the Eastern Car Company, and 2,000 cars from the Canadian Car & Foundry Company, has now placed orders, including the Pressed Steel Car Company's order which, however, may be still under negotiation, for a total of 22,000 cars, as follows: Pressed Steel Car Company, 7,000; Seattle Car & Foundry Company, 7,000; Eastern Car Company, New Glasgow, N. S., 2,000; Nova Scotia Car Company, Halifax, N. S., 2,000; American Car & Foundry Company, 2,000, and Canadian Car & Foundry Company, 2,000. The unconfirmed report in last week's issue to the effect that the Pullman Company had received an order for 8,000 cars is thus shown to be incorrect. All of the cars except those ordered from the Seattle Car & Foundry Company will have two trucks; those ordered from the Seattle company will be four-wheel cars.

### IRON AND STEEL

THE NORFOLK & WESTERN has ordered 1,000 tons of rails from the Cambria Steel Company, and 1,000 tons from another company.

THE MISSOURI, KANSAS & TEXAS has ordered 2,368 tons of steel for through truss spans and deck plate girder spans from the Wisconsin Bridge & Iron Company.

## Supply Trade News

The American Locomotive Company will soon reopen its Providence plant for the manufacture of shrapnel parts.

D. S. Woods, formerly Philadelphia salesman for Niles-Bement-Pond Company, Inc., has been transferred to New York.

The Corliss Carbon Company, Bradford, Pa., manufacturing motor and generator brushes, has moved its New York office and stock room to the Engineering building, 114 Liberty street.

The U. S. Metal & Manufacturing Company, New York, has been appointed eastern sales agent for the Union Fibre Company, Winona, Minn., makers of Linofelt for refrigerator and Feltlino for steel cars.

F. K. Irvin, formerly with the New York, New Haven & Hartford, has become connected with the Chicago office of the Niles-Bement-Pond Company. He will look after the railroad machine tool business in that territory.

The Standard Brake Shoe & Foundry Company, Pine Bluff, Ark., a new firm has taken over the Dilley Foundry Company, and will start work at once on the construction of a new \$40,000 plant, including an open-hearth steel foundry.

The Ballman-Witten Manufacturing Company, 5407 Easton avenue, St. Louis, Mo., has been incorporated with \$100,000 capital stock to manufacture piston rings. Lathes and boring machines will be installed. E. C. Ballman is president.

Charles William Sherburne, whose death was announced in these columns last week, was the founder of the railway supply firm of Sherburne & Co., Boston, Mass., and had been at its head for about 50 years. Mr. Sherburne was born in Boston on October 13, 1839. He was for a time employed on the Vermont & Canada, now a part of the Central Vermont, but soon returned to Boston to engage in the railway supply business, under the name of Sherburne & Co. Mr. Sherburne was a very active man, and until within a few years, he was president of the Armstrong Transfer Express Company, president of the Star Brass Manufacturing Company, a director of the Armstrong Dining & News Company, and treasurer of the New England Railroad Club. His death, in Boston, Mass., on May 6, followed an illness of three years.

H. E. Preston, formerly with the American Can Company, and prior to that with the Felt & Tarrant Manufacturing Company, Chicago, has joined the periodograph sales force of the Gisholt Machine Company, Madison, Wis., and will have headquarters at the company's Chicago office.

The Pittsburgh plant of the American Locomotive Company, which has been virtually idle for two years, is being overhauled and plans are being made for a complete resumption of work. It is understood that the plant has an order to repair 50 locomotives for the Seaboard Air Line.

Laurence Hamill, for some time district agent for the Buda Company, Chicago, and W. B. Hickox, formerly in charge of sales of the Adams Bagnall Electric Company, Cleveland, Ohio, have formed the Hamill-Hickox Company, with offices in the Hickox building, Cleveland. The new company will act as direct

representatives in Ohio and surrounding territory for railway supplies, and will continue to handle the Buda Company account and several others.

E. L. Myers, until recently with the Chicago Great Western, has been appointed by the Willard Storage Battery Company, Cleveland, Ohio, to take charge of the company's railway sales in the southwest. Mr. Myers began in 1888 as division lineman and construction foreman for the Western Union and the Santa Fe in California. From 1901 to 1909 he was construction foreman and general foreman on the Mexican Central, and from 1909 to 1913 he was chief electrician in charge of all electrical work on the National Railways of Mexico.

W. L. Clark, formerly vice-president of Niles-Bement-Pond Company, Inc., and for the past few months connected with the purchasing department of J. P. Morgan & Co., has recently left the latter to become connected with the Westinghouse Electric & Manufacturing Company. Mr. Clark is to be manager in charge of operations at the plants of the J. Stevens Arms & Tool Company, Chicopee Falls, Mass., and the Stevens-Duryea Company, Chicopee Falls and East Springfield, which the Westinghouse company has acquired to enable it to fill the large order for rifles which it has recently secured.

William Sterling Hodges, of the Baldwin Locomotive Works, with his wife and two sons, was lost in the sinking of the Lusitania. Mr. Hodges was born in Philadelphia on March 1, 1882, and was a graduate of the Central Manual Training School. He entered the drafting department of the Baldwin Locomotive Works on December 18, 1899. In July, 1912, he went to China as technical representative. He remained there about two years, returning in the summer of 1914. In September, 1914, he went to Russia and remained there until the middle of December. Early in January, 1915, he was assigned to duty as technical representative or agent in Paris. He went there with the intention of returning in April to take his family back with him to France. He returned to this country on the Lusitania when that vessel made her last trip west-bound, and a week later, with his family, sailed on the same ship. Mr. Hodges showed great capability as a designer in locomotive construction. He patented a number of devices, the best known of which is the trailing truck bearing his name.



C. W. Sherburne



W. S. Hodges

## TRADE PUBLICATIONS

**PAINT.**—The Paint Products Company, Chicago, has issued a booklet describing the "Cobar" process of manufacturing paints and paint oils.

**TANK CALIBRATION CURVES.**—The Universal Iron & Supply Company, St. Louis, Mo., manufacturers of tanks, has issued a leaflet containing a calibration curve for horizontal, cylindrical tanks of any dimension. A copy of this curve will be sent to anyone on application.

**ARCH TUBE CLEANERS.**—The Lagonda Manufacturing Company, Springfield, Ohio, has just issued a 12-page catalog entitled Lagonda Locomotive Arch Tube Cleaners. This catalog deals with the subject of scale removal from arch tubes in locomotive fireboxes and describes cleaners specially designed for this purpose. Copy will be sent on request.

**HYDRAULIC PUMPS AND VALVES.**—This is the subject of a mailing folder issued by the Hydraulic Press Manufacturing Company, Mount Gilead, Ohio. This folder contains illustrations and detail dimensions of the various hydraulic equipment manufac-



tured by this company. The folder is designated as bulletin No. 5000, and will be sent free on request.

**VACUUM CAR CLEANER.**—A four-page leaflet entitled bulletin No. 221A has been issued by the Thurman Vacuum Cleaner Company, St. Louis, Mo., describing the Thurman No. 2 portable electric car cleaning device. This vacuum cleaner is placed at the side of the coach seat to be cleaned and driven through an electric lamp cord from the lighting circuit in the coach or the terminal yard. The system is now in use on over 25 American railways.

**LEATHER GOODS.**—The Du Pont Fabrikoid Company, Wilmington, Del., has just issued an attractive bulletin on Fabrikoid, which is made with a face of cotton cloth coated with a tough flexible material and embossed by steel plates or rolls to produce the appearance and feeling of any desired natural leather grain. The cover of this booklet is printed in colors and shows five different colors and grains of Fabrikoid. The booklet is well printed and illustrated.

**COOLING CONDENSING WATER.**—The Spray Engineering Company, Boston, Mass., has issued bulletin No. 101, dated March 1, 1915, illustrating and describing the Spray cooling pond system of cooling condensing water. A number of good illustrations are included, showing various plants equipped with this system, and data is given concerning them. Bulletin No. 151 of the same company is entitled Washing and Cooling Air for Steam Turbine Generators, and contains eight pages dealing with this subject.

**HYDRAULIC FORCING PRESSES.**—This is the subject of catalog No. 92, issued by the Watson-Stillman Company, New York. This book contains 128 pages, thoroughly illustrated and deals with a large number of force and miscellaneous presses which this company manufactures. The catalog supersedes catalog No. 70 and part of No. 82. It is found convenient to divide the various tools into classes, making each class the subject of a catalog. At the back of this book a list is given of these classified catalogs.

**CONCRETE CONVEYOR.**—Four pamphlets have recently been issued by the Pneumatic Placing Company, Inc., 45 Broadway, New York City, describing the application of the pneumatic concrete conveyor to the lining of tunnels of small bore, the lining of double track railroad tunnels and the construction of viaduct pipes, retaining walls and abutments. These pamphlets describe the equipment necessary for each use and contain an estimate of the cost of concrete from the material bins into the forms, which in each case is 30 cents per cubic yard.

**IRON AND STEEL.**—E. F. Jackman & Company, agents for the Firth-Sterling Steel Company, have issued a folder containing a tribute to the railroads, which reads in part: "A railroad has been likened to an octopus by those who do not know the flesh and blood and personality of railroads. A railroad is a disciplined power; owning rails and cars and locomotives, engaging the highest quality of mechanical skill and expert knowledge, but the glory of a railroad is the united adjustment of its living nerves to patience, courtesy, speed and safety."

**WINDOW DEVICES.**—The McCord Manufacturing Company, Detroit, Mich., has issued a 56-page catalog dealing with the Universal window devices which this company manufactures. The book is handsomely gotten up and illustrated in color engravings as well as line drawings, the latter giving in detail the arrangement of the different window fixtures. These include weather stripping, locks and racks, sash lifts, anti-rattle bearings, stop casings and parting strips, sash balance brackets, sash balance chain connections, metallic sash, deck sash rachets, etc.

**WROUGHT IRON.**—The Interstate Iron & Steel Company, Chicago, has prepared for distribution a pamphlet entitled "The Business Message of the Wrought Iron Bar." The first part of this pamphlet contains a copy of the series of advertisements recently published in technical journals on this subject, in which are shown the advantages to be obtained by the use of wrought iron. This is followed by a description of the plant of this company in which various operations in making wrought iron are quite clearly described. Extracts of specifications of the material made are given, and the results of tests of various kinds of wrought iron are also included. The pamphlet is neatly illustrated and it is also written in an interesting manner.

## Railway Construction

**ATCHISON, TOPEKA & SANTA FE.**—This company is constructing about four miles of track, consisting of one main branch and several spurs, to serve the orange and lemon shippers at Corona, Cal. It will require very light work and very little bridging. The grading contract has been awarded to the Sharp & Fellows Contracting Company, Los Angeles, Cal. The track work will be done by the company forces. R. B. Ball, Los Angeles, Cal., is engineer of the Grand division.

**CANADIAN NORTHERN, ONTARIO.**—An extension of time in which to build the following lines in the province of Ontario has been granted by the Canadian parliament: From Washago to Kincardine; from Arnprior to Gananoque; from Pembroke to Cobourg or Port Hope; from Frenchman's bay to Owen sound; from Niagara river to Goderich; from Hawkesbury to or near Lanark; from Berlin through Guelph, Acton and Brampton to Toronto; from Berlin to St. Marys and Woodstock; from Sarnia to Chatham and from Orillia to Goderich, with a branch to Owen sound.

**CANADIAN NORTHERN, QUEBEC.**—The Canadian parliament has extended the time in which to build the projected line from Rawdon, Que., northerly to the National Transcontinental, also to build a branch from Jerome to St. Eustache, Que. (February 12, p. 289.)

An extension of time has been granted by the Canadian parliament in which to build the James Bay & Eastern from Lake Abitibi, easterly across the province of Quebec, and along the south end of Lake St. John to the mouth of the Saguenay river. (February 12, p. 289.)

**FULTON & EAST RICHMOND (Electric).**—Incorporated in Virginia, with \$50,000 capital, to build an electric line from Fulton, Va., to Montrose Heights, about 5 miles. E. F. Atwood, president; R. B. Allport, treasurer, Richmond.

**GLEN ROSE & WALNUT SPRINGS.**—This company has given a contract to the Rail Road Construction Company, New York, for work on a section of the line. Work was started in 1909 from Walnut Springs, Tex., north to Glen Rose, about 14 miles, and extensions are to be built from Glen Rose northeast to Ft. Worth, and from Walnut Springs southwest. About 20 miles has already been graded. J. H. Farr, president, Glen Rose, and D. Morris, chief engineer, Walnut Springs. (December 11, p. 1107.)

**INGLESIDE & EAST ARKANSAS.**—Plans are being made to build a line, it is said, from Ingleside, in Jackson county, Ark., east via Fisher, to a point in Pointsett county, about 25 miles. C. B. Richmond, St. Louis, Mo., is interested.

**JAMES BAY & EASTERN.**—See Canadian Northern, Quebec.

**LEHIGH VALLEY.**—Work is now under way by company forces constructing a new car repair yard at Coxtown, Pa.

**MCCONNELLSBURG & FT. LOUDON (Electric).**—A contract is reported let by this company to Reed & Company, Hazelton, Pa., to build from McConnellsburg east to Ft. Loudon, about 10 miles. E. J. Post, president, Washington, D. C. (March 5, p. 427.)

**NEW YORK SUBWAYS.**—The New York Public Service Commission, First district, will open bids on May 28, for the completion of certain finish work in the Fourth avenue subway, in the borough of Brooklyn. The line is expected to be open for business in June.

**OZARKS RAILWAY.**—A contract has been given to the Rail Road Construction Company, New York, to build a section of this line. The plans call for building from Springfield, Mo., through Mountain Home, Ark., thence along Buffalo river, and then south to Little Rock, about 215 miles. T. J. Murray, Mountain Home, Ark., may be addressed. (January 29, p. 211.)

**PALM BEACH & EVERGLADES.**—The Everglades Construction Company, which has the general contract to build this line from West Palm Beach, Fla., west to Lake Hippochee, has sublet to E. P. Maule, the work on the first section of 23 miles from West

Palm Beach, along the north bank of the West Palm Beach canal. Charles H. Baker, president, New York. (April 2, p. 767.)

**SOUTH DAKOTA ROADS.**—Financial arrangements have been made, and work may be started soon, it is said, on a line from Waubay, S. Dak., north via Grenville, thence northeast via Effington to Hankinson, N. Dak., about 60 miles. O. M. Henderson is the promoter.

**SOUTHERN RAILWAY.**—In connection with the export coal terminals now being completed at Charleston, S. C., by the Southern Railway, this company will construct a storage yard with a capacity of 400 cars.

**TENNESSEE ROADS.**—The Whiting Lumber Company, Butler, Tenn., will build a railway, it is said, from Butler to the summit of the Blue Ridge mountains. J. M. Lacy, superintendent of construction, Elizabethtown, Tenn.

## RAILWAY STRUCTURES

**ARDMORE, OKLA.**—The Oklahoma, New Mexico & Pacific will build a modern brick and concrete passenger and freight station at this place.

**BIDDLE, ARK.**—The Chicago, Rock Island & Pacific will build a small repair shop for light repairing at this place.

**CHICAGO, ILL.**—The W. C. Newman Company, 19 North Curtis street, Chicago, has been awarded a contract by the Union Station Company, for the construction of trunk sewers in Canal, Monroe and Clinton streets, and also concrete retaining walls. The work is in connection with the new terminal at Chicago.

The Union Station Company is asking for bids for the construction of the substructure and the superstructure of a trunnion bascule bridge to be built over the Chicago river at Monroe street. Thomas Rodd is chief engineer.

**EASTON, PA.**—The Central of New Jersey has work under way renewing the steel viaduct approach to the bridge over the Lehigh river at Easton. The design consists of eight double track deck plate girder spans varying in length from 53 ft. 5½ in. to 62 ft. 4¾ in., supported on six reinforced concrete piers. The greatest height of the structure from the surface of the ground to the top of the rail is 36 ft. The contract for the steel work, about 550 tons, has been let to the Phoenix Bridge Company. The floor of the bridge will consist of reinforced concrete slabs which are to be molded at a place convenient for handling, to be later put in place by locomotive derricks. No waterproofing is to be used. The contract for the reinforced concrete piers, of which four are required, as two were constructed several years ago, has not yet been let.

**EUFAULA, OKLA.**—It is reported that the Missouri, Kansas & Texas will build a 1,000-ft. bridge over the South Canadian river at this point. The new bridge will have 10 steel girders each 100 ft. long and concrete piers set in 10 ft. of solid rock.

**KANSAS CITY, MO.**—The Atchison, Topeka & Santa Fe will enlarge its grain elevator at this place. The addition will be of reinforced concrete and will consist of 28 cylindrical bins. Each bin will be 36 ft. in diameter and 90 ft. in height, increasing the capacity of the elevator by 2,062,000 bu. The present elevator contains 72 similar bins. Wells Brothers, 53 West Jackson boulevard, Chicago, have been awarded the contract for the superstructure work.

**LEWISBURG, TENN.**—A contract is reported let to the E. G. Holladay Co., Nashville, Tenn., to build a new passenger station at Lewisburg, to be used jointly by the Lewisburg & Northern and the Nashville, Chattanooga & St. Louis.

**PORT TOWNSEND, WASH.**—A terminal car barge landing is contemplated at this place by the Milwaukee Terminal Railway in connection with the Seattle, Port Angeles & Western. The work will be done by company forces.

**ST. PAUL, MINN.**—The St. Paul Union Depot Company is asking for bids on channel changes, levee walls, sewer extensions and riprapping in connection with the new union station at St. Paul. It was erroneously stated in last week's issue that the Chicago & North Western was asking for these bids.

## Railway Financial News

**CHICAGO & EASTERN ILLINOIS.**—The bondholders' protective committee has added the following to its membership: E. K. Boisot, vice-president, First Trust & Savings Bank, Chicago; Charles R. Butts, assistant treasurer, Norwich Savings Society, Norwich, Conn., and John J. Pulleyn, comptroller, Emigrant Industrial Savings Bank, New York. The committee is requesting the deposit of the general consolidated and first mortgage 5 per cent bonds and underlying bonds with the United States Mortgage & Trust Company, New York, or the First Trust and Savings Bank, Chicago.

**CHICAGO, ROCK ISLAND & PACIFIC.**—A petition has been filed in the United States district court at Chicago asking that N. L. Amster, F. W. Bauder, W. C. Crane, E. S. Dickerson, N. French, A. J. Keppelmann, C. Linkroum, G. G. Prentice and G. P. Ten Eyck be allowed to intervene in the suit of the American Steel Foundries against the Chicago, Rock Island & Pacific, which suit was the cause of the appointment of receivers. Among other things the petition says: "The railway company is not insolvent. Your orators, both personally and through their associates, believe it would have been feasible to meet or extend the maturing obligations of the railway company."

**NEW YORK, NEW HAVEN & HARTFORD.**—George B. Holbrook, of Springfield, Mass., has been elected president, succeeding John H. Alvin, of Concord, N. H., of the Connecticut River Railroad, a leased line of the New York, New Haven & Hartford.

**SOUTHERN PACIFIC.**—General Thomas H. Hubbard has been elected a director of the Southern Pacific, succeeding Hugh Neill, secretary, resigned. [General Hubbard died on Wednesday, as mentioned elsewhere in this issue.]

**THIRD CLASS PULLMANS ON THE BRIGHTON RAILWAY OF ENGLAND.**—The London, Brighton & South Coast has recently entered into a contract with the Pullman Company, Ltd., for supplying a service of third-class Pullman cars on the Brighton main line. The service will be inaugurated soon, beginning with the chief trains from London to Brighton and back, and will be gradually extended. The railway fares will be the same as the present third-class with 18 cents additional. Each Pullman car will have accommodation for 50 passengers, and the seats will be similar to the orchestra stalls of a theatre. Tables will be provided and the third-class passengers will be able to order tea or any other refreshments they require during the journey. The Pullman cars will be well lighted and suitably decorated. They will not be so luxurious as cars on the "Southern Belle," but will be equal in comfort to the usual corridor train, with all the advantages of the Pullman. The cars are now being built by the Pullman Company.

**WOMEN AS RAILWAY PORTERS IN ENGLAND.**—The announcement that the Great Central Railway is experimentally employing women as platform porters at certain stations shows another development in the policy of setting free more railway men of military age for service with the colors. Women have been successfully employed for some time as carriage cleaners by the Great Central, and it is from these women mainly that the porters have been selected. The experiment is at present being tried at Marylebone, Kilnhurst and Gainsborough, and so far the women porters have not been put into distinctive uniforms, though that matter is under consideration. Their work is confined to platform duties, as obviously women could not be expected to perform the more hazardous duties associated with a railway porter's occupation. Some of the railway companies have already engaged a number of women in the clerical and accountancy departments, and this movement is growing. Women booking clerks have been introduced at Willesden Junction, and there seems no reason why this practice should not be largely extended. At many French stations women were employed to a considerable extent as booking clerks before the war, and at stations on light railways in the south of France we have come across women who were in sole control.—*Railway Gazette.*